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AGRICULTURAL RESEARCH INSTITUTE

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The International Institute of Agriculture was established under the International Treaty of June 7th, 1905, which was ratified by 40 Governments. Seven other Governments have since adhered to the Institute.

It is a Government Institution in which each Country is represented by delegates. The Institute is composed of a General Assembly and a Permanent Committee.

The Institute, confining its operations within an international sphere, shall:

a) Collect, study, and publish as promptly as possible statistical, technical, or economic information concerning farming, vegetable and animal products, the commerce in agricultural products, and the prices prevailing in the various markets;

b) Communicate to parties interested, also as promptly as possible, the above information;

c) Indicate the wages paid for farm work;

d) Make known the new diseases of vegetables which may appear in any part of the world, showing the territories infected, the progress of the diseases, and, if possible, the remedies which are effective;

e) Study questions concerning agricultural co-operation, insurance, and credit in all their aspects; collect and publish information which might be useful in the various countries for the organization of works connected with agricultural co-operation, insurance, and credit;

f) Submit to the approval of the Governments, if there is occasion for it, measures for the protection of the common interests of farmers and for the improvement of their condition, after having utilized all the necessary sources of information, such as the wishes expressed by international or other agricultural congresses or of congresses of sciences applied to agriculture, of agricultural societies, academies, learned bodies, etc.

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AGRICULTURAL INTELLIGENCE.

NB. The Intelligence contained in the present Bulletin has been taken exclusively from the books, periodicals, bulletins, and other publications which have reached the Library of the International Institute of Agriculture in Rome during the months of December, 1910 and January, 1911.

The Bureau assumes no responsibility with regard to the opinions and the results of experiments outlined in the Bulletin.

The Editor's notes are marked [Ed.].

Development of Agriculture in Different Countries. — Scientific Institutions — Education in Agriculture and Forestry. — Experimentation. — Biography. — History of Agriculture.

Federal Budget of Agriculture in Switzerland (1).

Switzerland

The last *Message du Conseil Fédéral à l'Assemblée Fédérale* (*du 8 novembre 1910*), *concernant le budget de la Confédération pour 1911*, contains on p. 154 the following interesting figures regarding the expenditure of the Swiss Confederation for the development of Agriculture:

Account for 1909 Fr.	Budget for 1910 Fr.		Budget for 1911 Fr.
4 945 102	5 080 912	Total expenditure	4 908 914
1 113 890	1 125 000	Measures against threatened damage to agricultural products	1 125 000
900 019	700 000	Land-improvement	1 000 000
54 326	57 040	Theoretical and practical schools of agriculture	56 806
15 602	16 200	Horticultural school of the Canton of Geneva	16 258
109 189	128 115	Winter agricultural schools	132 955

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(1) The statistics for 1909 (population 3 584 815 inhabitants; agricultural expenditure 4 945 107 frs.) show that the Swiss Federal Government spends 1.38 fr. per head of the total population on agriculture. But the real expenditure on agriculture in Switzerland is just double this amount per head. For the Canton Governments together spend a sum nearly equal to that spent by the Federal Government.

On comparing this expenditure with the area under cultivation (3 090 000 hectares, or 74.8 per cent of the total area) it will be seen that the Federal Government spends on agriculture 1.60 fr. per cultivated hectare, which sum is doubled if the sum spent by the Cantons be taken into account. [*Ed.*].

Account for 1909 Fr.	Budget for 1910 Fr		Budget for 1911 Fr
45 470	45 000	Agricultural lectures and special courses, organised by the Cantons . . .	45 000
35 461	50 040	Canton schools of vine culture, and vine-growing experiment stations . . .	41 505
32 444	33 525	Dairy schools	35 150
579 990	555 000	Cattle breeding	555 000
150 826	167 000	Horse Breeding	167 000
37 557	40 000	Breeding of sheep, goats, pigs, etc. . .	40 000
10 000	10 000	Encouraging the production of cattle for meat	10 000
500 000	500 000	Subsidies for restocking vineyards . .	500 000
378 621	422 892	Federal Agricultural Institutions:	
		a) Agricultural Institutes for experiments and analyses	330 030
86 846	91 800	*b*) Experiment Stations for arboriculture, viticulture and horticulture at Wädenswil	77 500
340 266	410 200	*c*) Stallion and foal dépôt at Avenches.	287 450

2 MICHOTTE DE WELLE. **Agriculture in Servia.** — *Recueil consulaire publié par le Ministère des Affaires étrangères du Royaume de Belgique*, Bruxelles, 1910, T. 151, 6e Livr., pp. 452-455.

More than eight tenths of the entire population of Servia are agriculturists.

Servia

Although the soil of Servia is very fertile as a rule, it does not yield anything like the crops that could be obtained, if it were cultivated and improved according to modern ideas. For five years, that is, from 1900 to 1904, the production per hectare varied between 4.91 and 11.78 metric quintals for maize, and from 5.9 to 9.77 for winter and spring wheat. Progress is rendered difficult by the extreme sub-division of the land; nevertheless the crops have begun to increase owing to the action of the agricultural associations, which are at present 900 in number, counting 40 000 members in all. The importation of agricultural machinery, instruments and tools into Servia is valued at a million francs annually, in round numbers. All the machinery bought by the members of Cooperative Societies is imported from Germany.

3 A. Brilinski. **Agriculture in the Steppes of Chirvan (Caucasus). Irrigation and Colonisation.** (Yougo-Vostotchnaya tchast Chirvanskoi Stepi, Bakinskoi Gubernii, i eia orochenie v Tsieliakh Kolonisatsii). — *Selskoie Khosiaistvo i Liesovodstvo* (*Agriculture and Sylviculture*). God. LXX, Kniga, V, pp. 454-478. St. Petersburg, Noiabr 1910.

Russian Empire: Caucasus

The Steppe of Chirvan lies between the Caspian Sea and the River Kur, and is bounded on the North by the spurs of the Caucasian range. It is for the most part a vast plain sloping from West to East, broken here and there by regular systems of terraces formed by periodic invasions of the sea, which once covered the whole of this region. Alluvial soil prevails in the lower, and soils of Eolian origin (loess) in the higher parts.

As the rainfall is very low, the only cultivated portions of this region are those skirting the rivers, where irrigation is possible.

The mode of cultivating cereals is very primitive: the fields are flooded in spring, and remain under water till August, when the seed is sown without any previous tilling of the ground. The yield is, however, fair; wheat, 65 to 70 *pud* (pud = 16.38 kg., or 36 lbs. English), barley, 80 to 85 pud per *deziatin* (deziatin = 1.09 hectare, or 2.69 Eng. acres).

Great care is taken with market gardening, the soil being tilled several times, and well watered. Melons, cucumbers and tomatoes are raised, and the crops are sometimes worth 100 roubles (about 405 frs.) per *deziatin*.

Wherever adequate irrigation is possible, rice is grown, producing 400 pud per *deziatin* (about 6552 kg.).

The whole of the steppe could recover its former fertility, if it were systematically colonised with plenty of capital and labour. It is traversed by a wide river and lies near the great basin of the Caspian Sea, and its climate is suited to every kind of sub-tropical crop, so that it would well repay irrigation and farming. Experiments show that cotton will in the future be the most important crop.

The nomadic population raises some live-stock, using the flesh and milk for food, and the wool and hides for making their clothes and tents.

Sheep, buffaloes, camels and horses are bred, the first however are by far the most numerous and valuable. The Kurd sheep is strong and of a good shape; the meat is excellent, and a special cheese is made from the milk. The animals graze on the steppe in winter, and in summer on the mountains.

4 R. Efimov. **Agricultural Condition of the Government of Irkutsk (Siberia).** (Selskoie Khosiaistvo v Irkutskoi Gubernii i Miestniia agronomiceskaia Mieropriiatia). — *Selskoie Khosiaistvo i Liesovodstvo.* (*Agriculture and Sylviculture*). God. LXX, pp. 421-440. St. Petersburg, November 1910.

Russian Empire: Siberia

Agriculture. — Only about 1 per cent of the total area of the Government of Irkutsk is under cultivation.

Biennial rotation is adopted as a rule, the soil being cultivated one year and the next allowed to lie fallow. In districts, however, where arable land is rare and difficult to work, the triennial system is adopted: winter rye, oats, the land then lying fallow for a year.

There is a continuous increase in the importation of agricultural machinery, Sack ploughs, disk harrows, etc., and more systematic methods of cultivation are becoming general, as well as the use of fertilisers.

Cereals are the most important produce of the country: winter and spring rye, oats, March wheat and barley form respectively 60, 18.5, 13 and 5.5 per cent of the total cultivation. The excessive dampness of winter makes the growing of winter wheat uncertain and risky, and all attempts in this direction have been unsuccessful.

The proportion between the seed sown and the yield is seen from the following table (1 *pud* = 16.38 kg.; 1 *Deziatin* = 1.09 hectare].

	Seed Sown	Average Yield
Winter Rye. . .	9 *pud*	52 *pud*
Spring Rye. . .	12 »	56 »
Oats	15 »	66 »
Wheat	12 »	57 »
Barley	13 »	64 »

Potatoes, millet and hemp together only form 3 ½ per cent of the crops. An attempt is being made to substitute the Russian red-grained millet for the black Siberian. The experiments made so far have shown that maize does not adapt itself at all to the conditions of the country. Agriculture is practised only by Russian emigrants. The Buriates are almost exclusively breeders of cattle, but when the prices of cereals are high, they turn agriculturists.

Steppe cultivation. — The cultivated grass-land covers an area of 321 745 *Deziatin*, and for the most part belongs to the Buriates, whose chief occupation is cattle raising. The meadows are irrigated and manured whenever possible, horse manure being collected and placed on the land during the winter, and spread in spring. The average hay crop in *puds* per *deziatin* is as follows for the various districts:

District	In irrigated soils	In non irrigated soils
Balagansk	81	49
Irkutsk	109	41
Nixneudinskii	81	47
Verkolensk	86	68
Kirensk	166	89

There is thus an average of 17 quintals on irrigated, and 9 quintals on non-irrigated soils for the whole of the Government. The principal meadow plants are Gramineae (*Phleum*) and Leguminosae (clover, vetch and lucerne).

The increase of population and the progressive cultivation of vast belts of land is necessarily bringing about a proportional decrease of pasture; consequently the cultivation of forage plants has been started in several places. The results, as regards red clover, were unsatisfactory, but good results were obtained with Timothy (*Phleum pratense*), which yields two good crops of hay in one summer, if sown after the cereals are harvested.

The failure of clover is due to the dryness of the climate, to frequent frosts, and to the superficial tillage.

The cultivation of land formerly exclusively used for pasture, and the increase of population in town and country have led to improvements in stock-breeding in the government of Irkutsk.

The Buriate breeders (Mongolian natives) formerly considered only the numbers of their cattle, but now, under the influence of new requirements, introduced by immigrants, they are turning their attention to quality also.

There are only approximate data concerning the total number of live stock; it can be stated, however, that cattle represent the principal element (36 %), after which come sheep, horses, pigs and goats in the proportion of 27, 26, 6.3 and 4.4 % respectively.

There are two types of horses: the Buriate horse, valuable as a saddle-horse, fleet of foot, but small and lightly built; and the draught and cart horses of the peasants, which are imported from Western Siberia, and are much bigger and stronger.

The native cows are small and ugly animals, and do not give on an average more than 60 vedra of milk a year (1 vedro = 2 $^3/_4$ imp. gallons). In summer they give none, owing to the numerous mosquitos and other insects which follow the herds and prevent cows from grazing undisturbed. The introduction of railways and the growth of the town population have so much increased the demand for milk and its products that the local supply is quite inadequate.

The high price of milk (80 kopeks per vedro: one kopek about one farthing) does not admit even of the manufacture of butter, which would cost more to make than to import.

During the summer the market of Irkutsk is supplied with meat by herds coming from the neighbouring Mongolia; in winter, slaughtered meat is dispatched direct from Tobolsk and Tomsk. Hence the necessity for improving the breed of cattle. This need is already understood by the native agriculturists, as is proved by the increasing import of selected types from Western Siberia and from the Governments of Perm, Jaroslav and Samara.

Sheep. — There are two kinds of sheep: *a*) the Buriate sheep, with white wool and black or yellowish head; *b*) the peasants' sheep which are very small and have black wool.

Pigs. — The breeding of pigs has lately assumed remarkable importance. Good results are obtained by crossing the native breed, which does not fatten easily, with Yorkshire pigs.

On the 1st of January 1900 the Statistical Committee of the Government of Irkutsk published the following statement as to the numbers of animals in the country:

Horses, 254 463;
Cattle, 352 989;
Sheep, 268 028;
Pigs, 61 969;
Goats, 42 771.

5 A. Aaronsohn. **Agricultural and Botanical Explorations in Palestine.** - U. S. *Dep. of Agr. Bureau of Plant Industry*. Bull. No. 180). Experiment Station Record. November, 1910.

Palestine. United States: California Arizona

Attention is called by this publication of the U. S. Dept. of Agr. to the similarity between Palestine and California as regards general conformation, climate, rainfall, and vegetation; and it is claimed that many of the plants of Palestine could thrive in California, Arizona and other similar regions of the United States.

The carob tree yields a greater quantity of food matter per acre on arid soil than the best alfalfa, the pods containing 40 per cent or more of sugar and from 7 to 8 per cent of protein. It appears that berseem (*Trifolium alexandrinum*) originated in Palestine, since it grows wild there as do *T. carmeli*, *T. panormitanum*, and *T. supinum*. *Atripex palestina*, *A. halimus*, and *A. leucoclada*, are well adapted to alkali soils. *A. leucoclada* grows from 3 to 6 ft. high and is relished by sheep and camels. The stems and the leaves of the Palestine chick-pea are corrosive because covered with crystals of oxalates and other hygroscopic salts which are thought to render the plant drought resistant by condensing atmospheric humidity. Sesame grows on loamy soils where the rainfall is 16 inches or less, but requires thorough preparation of the soil. The lack of uniformity with which it ripens necessitates several harvestings by hand.

A number of fruit trees also growing in Palestine might be successfully used as stocks for extending fruit culture in certain regions of the United States, where fruit growing is now either unsuccessful or limited. These include *Zizyphus spinachristi* and *Z. lotus*, and *Paliurus spinachristi* recommended as stock for the Chinese jujube: *Pistacia terebinthus*, *P. palaestina*, and *P. atlantica* as stocks for the pistacio nut; *Amygdalus communis*, *A. orientalis*, *Prunus microcarpa*, *Prunus ursina* and *P. cerasa* as stocks principally for almonds and apricots; *Crataegus azarolus*, *C. orientalis* and *C. sinaica* as stocks for pears and possibly apples, and *Pyrus syriaca* as a pear stock. The possibility of securing valuable results from the above by hybridization and selection is also suggested. Among these plants are included stocks adapted for moist, arid, and alkali soils, as well as for both high and low altitudes.

In addition to the wild types of trees suggested for stocks, many cultivated fruits are mentioned as considered worth trying in the United States, including apricots, quinces, pomegranates, olives, figs, dates, grapes and oranges.

A number of plants of secondary importance are mentioned, for instance, a very early watermelon, with a thick rind, which grows on the poorest soil and is extensively exported, as it can travel uninjured for from 2 to 3 weeks; a winter muskmelon cultivated in Caesarea; a medicinal desert plant, *Citrullus colocynthis*; the Arab "Akub" (*Gundelia tournefortii*, the white juicy shoots of which are eaten like artichokes; wild "artichokes" *Cynara syriaca* and *C. aurantiaca*); a desert tannin plant, *Tamarix articulata*, and a plant for the fixation of desert sand dunes, *Calligonum comosum*.

Canadian Progress. — *Journal of the Royal Society of Arts*. London, December 10th, 1910. **6**

Canada

Mr. O'Connor said. "I have had the opportunity of seeing the great West, and all I heard and read of that wonderful region fell infinitely below what I found there.

"The boundless open prairie of the best wheat land in the world revealed to me the notable fact that in Canada you have the greatest possession yet unconquered by the people and labour of the world. It is a veritable Eldorado, not requiring the toil or peril ordinarily experienced by pioneers, but just holding out its precious and boundless bosom to all in the world who have courage, enterprise, and hands which are willing to pick up its treasures."

CARTWRIGHT. **Agricultural Progress in Ecuador.** (Trade and Commerce of Ecuador). — *Diplomatic and Consular Reports*, No. 4560, 1910. London. **7**

Ecuador

The general agricultural progress of the coast districts of Ecuador has continued actively during the year. A new Company has been formed for the working and development of the Tenquel cocoa and rubber estate, which is of vast extent and capacity, and as this Company has the right to extend its operations, there is good reason to believe that the valuable neighbouring estates of Pagna, Chaquana and others may ultimately be exploited.

Many projects for new plantations of cocoa and rubber are also being actively developed in London. There are also large estates now worked by German syndicates.

Ecuadorian agriculture requires, above all, an active increase of labour to develop its possibilities.

8 E. Robyns de Schneidauer. **Agriculture in Parana (Brazil).** — *Recueil consulaire publié par le Ministère des Affaires étrangères du Royaume de Belgique*, Bruxelles, 1910, T. 151, 1re Livr. pp. 77-79.

Brazil: Parana

Practically the only agriculture in Parana is carried out on a small scale by emigrants, or families of foreign extraction. Whether the farmer be a foreigner or a Brazilian, he is called a colon, to distinguish him from the native *caboclo*, more or less of a nomad, who farms in the most primitive manner. The lands cultivated are generally forest lands, the prairie or *campo* being used only for stock-breeding.

Among the chief agricultural products of Parana is sugar cane, which is cultivated in the lower parts of the country, mainly on the sea-coast; it is not used for manufacturing sugar, which is imported from Pernambuco, but brandy (*cachassa*) is made from it for local consumption. Bananas are also cultivated and exported in considerable quantities. The flour made from *manioc* grown in the country is sufficient for local needs.

The *fazendeiros* of Saint Paul have large coffee plantations in the frontier region of the State, in the valley of Paranapanema, and 591 480 kg. of coffee were exported to Santos in 1907-1908.

Maize, black beans one of the chief foods, and rye, are also grown (1).

The vine is mainly cultivated by Italians, and the Santa Felicidade Colony supplies most of the wine for the capital. It is light and well suited to popular consumption, none of it being sent abroad. A good deal of wine is imported from Rio Grande do Sul and from foreign countries.

A small amount of tobacco and onions is exported.

Vegetables are raised in quantities on the plateau of Curityba and in the neighbourhood of the towns; the principal fruits cultivated on the plateau are peaches, grapes, figs, and quinces. Oranges also are grown in various parts.

9 . Johann Potucek. **Agriculture in the State of St. Paul (Brazil) in 1909-1910** (Sao Paulo). — *Berichte der kk. Osterr. Ung. Konsularamter*, Wien, Nov. 1910.

Brazil: St. Paul

Coffee is by far the most important agricultural product of St. Paul, and the crop rose to nearly 12 million sacks of 60 kg. in 1909-1910. The

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(1) The black haricot of Brazil is a variety of *Phaseolus vulgaris*. Professor O. Comes [Del Fagiuolo Comune; Atti del R. Istituto d'Incoraggiamento di Napoli, Ser. VI, 1909, p. 121], considers this haricot as a hybrid [*atro-cyaneus*] of *Phaseolus vulgaris compressus* and of *Phaseolus vulgaris ellipticus*. [*Ed.*]

Government still prohibits new coffee plantations, and is trying to encourage varied farming and cattle raising by facilitating the importation of cattle, organising exhibitions, distributing gratis seeds and shrubs, opening Experiment Stations and generally diffusing agricultural training.

Coffee is cultivated in large plantations, but all other products are raised on a small scale, which favours small holdings and colonisation.

The cultivation of rice is extending so greatly that it more than suffices for home consumption and is being exported to other Brazilian States. Hitherto the State of St. Paul has imported all its wheat from abroad and in 1909 was importing 99 933 tons; but the Government has organised some experiments in cultivating this product, with the object of using waste lands for growing cereals, and the results last year were very satisfactory.

Fruit cultivation is extending rapidly: the main exports are bananas and *abacaxis*, a species of pine-apple. Melons are grown on a fairly large scale, but are not exported, and the same may be said of oranges and lemons, the chief reason for this being the high transport tariffs.

Other crops which are developing considerably are sugar cane, for distilling alcohol, and cotton, which is not yet produced in sufficient quantity to supply the needs of the prosperous spinning mills of the State. The quality of the St. Paul cotton, however, is not to be compared to that of the northern States of Brazil.

In 1909, 2146 stud animals, of the value of 105 159 paper-milreis (157 738.50 frs.) were imported, among which were 575 Indian Zebus, and 1400 sheep from Uruguay.

Sylviculture. Many of the forests of the interior have been burnt and replaced by poor plantations of maize. The railways burn wood for fuel and the consumption and waste has been enormous. There is no forest law to prevent abuse and destruction. The high cost of carriage prohibits the exportation of timber.

E. ROBYNS DE SCHNEIDAUER. **Agriculture in the State of St. Paul (Brazil).** — *Recueil consulaire publié par le Ministère des Affaires étrangères du Royaume de Belgique.* Bruxelles, 1910, T. 151, 1re Livr., pp. 22-27. 10

Brazil: St. Paul

Rice is generally cultivated without irrigation in St. Paul, except in large plantations. A demonstration field for rice-culture under irrigation has been opened by the Government at Moreira César. The total rice crop of St. Paul was estimated at 10 million litres for the year 1906-1907.

Maize is grown all over the country, and often between the rows of trees in coffee plantations.

Sugar cane is also raised throughout the State and is used for extracting sugar, distilling spirits, and as fodder; there are some very large plantations in the district of Piracicaba. In 1909 there were about 50 000 hectares planted with sugar cane. There are about a dozen large sugar mills in the State of St. Paul: distillation of cane brandy (*cachassa*) is one of the chief agricultural industries. In addition to the large works, there are many small distilleries and primitive mills where spirits, *rapadura* (a kind of raw sugar), and a small quantity of ordinary sugar are manufactured.

The cotton cultivated here is inferior in length of staple to that grown in other Brazilian States, too little attention being given to selection.

About 55 000 *alqueires* (133 100 hectares) were under black beans in 1905. Although *manioc* is indigenous, it is not enough cultivated here. It is affirmed that wheat used to be grown in St. Paul, but it must have been on a very small scale, and now it is only grown in Experiment fields and is said to be very subject to rust; perhaps some varieties could be acclimatised, but the tests made so far with a large number of various wheats have not given very encouraging results. Barley is not cultivated at all.

Tobacco, which was introduced a long time ago, has never become an industry of much importance, only about 4709 hectares being under tobacco.

The vine is but little cultivated for wine making. The wine hitherto produced is generally acid, as it is at Rio Grande do Sul.

The consumption of potatoes is much greater than the production.

Sorghum, arrow-root, ground-nuts, sweet potatoes etc. are amongst the most successful crops. Bananas and pine-apples form a large part of the export trade.

11 FRANÇOIS CHASTRE. **Agriculture and Cattle Breeding in Argentina.** — *A travers l'Argentine moderne.* Paris, Hachette 1910. pp. 83-126.

Agriculture has greatly progressed during the past twenty years in Argentina; in 1895, 59 % of the total exports were cattle, and 39 % farm produce: these figures had changed to 49 % and 47 % respectively in 1903, while at the present day farm produce accounts for 62 % of the export, only 32 % being cattle.

Argentina

This development of agriculture has considerably increased the value of the land. In 1880 the Government sold land at 880 frs. the square league (2500 hectares), to-day the same lands are sold for a thousand times that price. The most important factor in increasing the value of the land has been the recent acclimatisation of lucerne, which grows very rapidly, and thus escapes the two scourges of the country, drought and locusts.

According to a recent law, no one person may acquire more than a square league (2500 hectares) of land within the domains of the State. The great landowners, in view of the enormously increased value of land, have divided their estates, selling or letting part on lease. There are, however, still some *estancias* of 175 000 hectares, and many between 50 000 and 100 000 hectares in extent.

The three chief crops raised are wheat, flax and maize. The crops are endangered not only by drought and locusts, but also by rabbits. It is difficult to understand why the *estancieros* of the pampas should have introduced such a terrible enemy into their lands.

Argentina has been raising cattle for two centuries. and has become past mistress in the art. The *estancieros* have made an enormous outlay on pure-bred stallions, bulls and rams to improve their stocks; 1124 stud Shorthorns were brought into Argentina in 1904, and 2190 in 1906; 25 000 frs. a head was paid for a number of bulls bought in England, and a stallion, *Diamond Jubilee*, cost 787 500 frs.

There are immense plantations in Rio Negro, Chubut and Santa Cruz. which mostly belong to English Companies. The largest estate belongs to the Argentine Southern Land C°., an English *estancia*, which possesses 656 000 hectares. In spite of this prosperity, two thirds of the land fit for cultivation and stock-breeding still lie fallow. The main sources of profit in cattle raising are the sale of live animals and the exportation of wool and frozen and salted meat. The trade in live stock is not very large, and tends to decrease. In 1905, 263 000 head were exported, while in 1906 the number had fallen to 71 000. In 1907 Argentina had 112 804 250 head of cattle and exported, either alive or as frozen meat, 468 362 head of cattle, and 3 052 699 head of sheep. To these figures must be added 726 000 horned cattle slaughtered, 39 900 of which were made into salted beef (*tasajo*) and 326 100 into meat extract for exportation, besides the local consumption of oxen and sheep, which had risen to 2 323 543 heads in 1907. In the form of frozen meat 550 000 young oxen are exported every year.

The price of cattle is relatively low, the average price of an ox weighing 600 kg. being about 200 frs. and of a sheep of 60 kg. about 20 frs. There is a large and remunerative trade in ox and cow hides.

Agricultural Production and Commercial Progress in French Equatorial Africa. — *Bulletin de l'Office colonial*, N. 35, pp. 321-328. Melun, 1910. 12

French Equatorial Africa

Everything agricultural remains still to be done in the Middle Congo, the only attempts at cultivation made by the Europeans so far having been in rubber. The cultivation of cotton is beginning to develop, however, the initiative in this direction of the late Colonel Moll having been followed by the Colonial Cotton Association. The cotton could, as a matter of fact, be exported by the rivers to Bénoné and the Niger, and the lighters, instead of going back empty, might use this fibre as a return freight. An attempt is to be made, at any rate, and some picked cotton has already been sent to various places.

The local administration is also becoming interested in ostrich raising.

If the commercial and economical situation in the Middle Congo is only mediocre, it must be regarded as really bad at Gabon, where the fall in rubber has been felt more than in any other part of the Congo. The market price can only be raised by improving the local quality.

A crisis also has occurred in the timber trade, which however will only be temporary, as timber ranks first among the exports from Gabon.

The cultivation of cacao has been started in the Gabon estuary; the production will gradually rise to an average of 2.5 kg. per tree every year There are at present 60 plantations in the Colony and a million young trees in full growth.

The other cultivations attempted by Europeans are of less interest.

The poorer products (maize, manioc, palm oil, palm kernels), have so far been neglected, and the Administration is trying to start a trade in these that will be susceptible of development on a large scale. The local coffee seems to be more appreciated every day.

13 G. B. HADDON SMITH. **Measures taken by the Government for the Promotion of Agriculture in Sierra Leone.** (Sierra Leone Report for 1909). — *Colonial Reports*, N. 648. London, 1910, p. 53.

Sierra-Leone

At the experimental farms at Yamadu in the Konnoh section of the Railway district and at Batganu in the Karene District, it has been shown to the natives that by deep hoeing and rotation of crops, rice can be grown without letting the land lie fallow. At Kennema, the head quarters of the Railway District, a nursery for rubber, coco palms and copal plants (1) has been established. Some Para Rubber seedlings and a large number of *Funtumia Elastica* seedlings were planted on the hills in the neighbourhood of Kennema. In the Ronietta District the copal gum trade has revived owing to the adoption of more careful methods of incision. The natives have been encouraged to make new plantations. Kola plantations have been established at Mano and Moyamba. They have been made by the chiefs, but at the suggestion and under the supervision of the Government, thus avoiding the great defect of native plantations, namely over crowding, which leads to the development of a parasite. Kola is extensively grown both in the Colony and Protectorate.

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(1) *Copaifera copallina* H. Bn. supplies *Sierra Leone copal*, a substance much used in preparing varnishes and different from other resins which also bear the name of copal but are extracted from various species of *Hymenea* (BARRAL-SAGNIER, *Dict. l'Agric*, Paris, 1888, Vol. II, p. 309).

Zanzibar copal is produced by the *Trachylobium Hornemannianum* a leguminosa, Madagascar copal is extracted from the *Trachylobium verrucosa*, West African copal from *Guibourtia copalifera*, and Indian copal from *Vateria indica*, a Dipterocarpa which produces white *dammar*.

See GEORGE WATT, *Dict. of the Economic Products of India*, Calcutta, 1889, Vol. II, p. 520. [*Ed.*]

Attempts were made by the Government to increase the raising of new seedlings by offering a bonus to successful cultivators, and as a result 1200 seedlings have been raised in the Headquarters district. Efforts have also been made to improve still further the cultivation and preparation of ginger by giving a grant for every farm worked on the improved system.

An attempt was made to introduce cocoa trees into the Protectorate, which are grown on a small scale in the Colony. 120 000 seeds were given by the Government to the chiefs and planted by them. The experiment has given good results.

Buildings for an agricultural Academy are now being erected at Mabung in the Protectorate, with the bequest of the late Mr. S. B. Thomas.

F. Wohltmann. **German Colonial Development.** (Neujahrsgedanken 1911). — *Der Tropenpflanzer*. Berlin, Jan. 1911, 15 Jahrgang, No. 1; S. 1-22. **14**

German Colonies

During the past twenty-five years, the development of the German Colonies has not only been founded on a solid basis, but has also entered on a period of great expansion. There are at present in the German Colonies 35 Colonial Companies with an initial capital of 123 million marks (1), 18 Joint stock Companies with a capital of 32 million marks, and 172 limited liability Companies with a capital of 40 million marks, making a total of 225 companies, with an aggregate capital of about 200 million marks.

There are besides private undertakings of all kinds, the number and means of which it is practically impossible to state; the greater number, however, may be considered as closely connected with agriculture, directly or otherwise.

That much interest is taken in Germany in colonial questions, the last Colonial Congress at Berlin afforded a striking proof. The annual demand in Germany for colonial produce reached a value of 2 346 000 000 marks in 1909, and the German Colonies were only able to supply this demand to the extent of 2 1/2 per cent. In a note published in 1909, M. Wohltmann foresaw the possibility of the German Colonies producing sufficient for the needs of the mother country, and he therefore advised a rapid and energetic expansion of their agricultural resources.

The greatest development of the past two years has taken place in German South-East Africa, where a large number of new farms have been started, and those already existing have been improved by the introduction of good breeds of cattle in harmony with the general improvement of the farms. This last point is one that should be kept in mind, if it is desired to avoid the errors that have been committed in many places by introducing choice European breeds into farms which were not well organised, or arranged for careful stock-breeding.

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(1) Mark = 1 25 frs.

The importation of breeds of sheep from Australia has been attended with great success, and it is expected that the most satisfactory results will be obtained from Angora goats. The conditions in German West Africa are particularly adapted to this breed, and greatly favour the production of wool of a superior quality. The Persian breeds, which furnish the Karakul skins of which Germany at present buys 10 million mark's worth each year, would also be very remunerative to the sheep raisers of this Colony.

The development of stock-breeding in German East Africa is closely allied to the improvement of grazing lands, and for this reason, the institution of numerous agricultural experimental Stations, furnished with laboratories and a staff of scientific experts is desirable. The services rendered by these stations would largely repay the outlay. M. Wohltmann mentions the activity of the United States and the Experimental Stations of Arizona, New Mexico and South California, which are paying special attention to this problem; and expresses his hope that their example may be followed, so that capital be not badly invested or even lost owing to the lack of reliable scientific data on the agricultural requirements of these regions.

Cultivation is progressing generally in German East Africa: both sisal-grass and manioc promise to be very successful. To develop cotton growing, the climate of the different regions must be more carefully studied, as it varies very considerably according to the situation. The staff experimenting in the cultivation of cotton has recently been increased, and will shortly be able to show some final results, now that it is able to work on a larger basis. Irrigation works on a large scale fed from big reservoirs are impracticable in this country owing to the uncertain supply of water obtainable from the large rivers, which are not fed from the glaciers in the summer months. The only means of extensive irrigation would be the construction of large natural reservoirs with all the necessary dam and lock works.

Small irrigation works would do well in localities where the rivers, though not large, have a fairly constant supply of water.

The cattle-breeding problem presents great difficulties in this Colony; it appears that sheep can only be raised on the high plateaus, more than 100 m. above sea level.

In the Cameroons, the revenue from cacao has fallen greatly during the past few years owing to the drop in prices, but one good result of the change has been that the growers have had to adopt more modern methods to lessen the cost of production. Rubber, on the contrary, within a few years will yield a fine return to the planters, and the cultivation of the plant is extending remarkably.

The development of this Colony, however, can only be completed when the railways have opened communications with the Hinterland, when vast extents of land can be cultivated in tobacco, coffee and cotton, and can also be used for cattle raising.

The agricultural conditions in New Guinea and Samoa are equally satisfactory. The Agricultural Colonial Committee for the extension of rubber cultivation in New Guinea has ensured the future of this crop. It has arranged that a certain price be paid to the natives for the product, has instituted sale and purchase stations, and distributed money prizes under the control of the local authorities.

In reviewing the prospects for working the soil in the Colonies, mention is made of the future in store for petroleum motor ploughing. This subject needs careful study and Stations and experiment fields should at once be established, in view of the special conditions of the climate and soil of the Colony. With regard to manures, the writer first of all gives warning against the false notion of the inexhaustible fertility of tropical soils, and says that complementary fertilisers ought to be used from the beginning, according to requirements, as the plantations would then last twice as long, and there can be no comparison between the profits obtainable from a cacao plantation which dies out owing to the exhaustion of the soil at the end of 15 or 20 years, and a plantation regularly manured and likely to be fruitful for from 40 to 50 years.

As a rule, the South West African Colonies have no need of potassic manures, the soil being from 10 to 20 times richer in potash than that of East Africa, or the rainy regions of the Cameroons and Samoa, in which two Colonies the potassic manuring of cacao plantations has given the best results. Manures containing ashes should be tried in tropical climates in all cases where the growth of the plantations is rather poor.

Phosphatic fertilisers present greater difficulties. Soluble phosphates can rarely be used in red and yellow soils, which are rich in iron, because they return immediately to the insoluble state. Thomas slag and bone dust might be more satisfatory and it is suggested that the simple phosphorites might give very good results in many tropical soils that are rich in humus, just as they do in certain peaty soils.

Soils watered by abundant rains are always rich in nitrogen. The rains carry large quantities of the latter to the soil; indeed, it may be said that 25 kg. of nitrogen per hectare per 1000 mm. of annual rainfall is not too high a figure. As the rainfall is 4000 mm. in these regions, 100 kg. of nitrogen accumulate yearly in the soil, even if the whole quantity does not remain in the cultivated layer, and will be utilised by trees.

The bacteriological activity of these soils is very great, and lasts all the year round on account of the favourable temperature.

The bacterial flora comprises the best known forms: *Azotobacter, Clostridium Pasteurianum*, etc. From 24 to 30 kg. of nitrogen per hectare may be considered as produced by bacterial activity. Nevertheless, nitrogenous manures are very useful in certain cases, and it is suggested that ammonium sulphate, superphosphates of ammonia, dried and powdered blood and Peru guano should be used.

Special stress is laid on the fact that the results from manuring in tropical regions, and especially in the case of trees, must not be expected before 2 or 3 years; in fact, plants possess to such a degree the power of adapting themselves to an insufficient supply of some nutritive element that no change in their habits occurs during the first year of manuring. The problems of fertilising, of the selection of plants and seeds, of increased cultivation, etc., need prompt solution, if the Colonies are to develop rapidly. Agricultural Stations with a fixed staff are required for these purposes and would serve at the same time to stimulate emulation amongst the farmer colonists.

In conclusion, an appeal is made for the establishment of such Stations, furnished with all the means necessary for promoting the prosperity of the German Colonies.

15 **State Plantations in Belgian Congo.** — *Revue Générale Agronomique*, Bruxelles, 5^me^ année, N. 10, 1910.

Belgian Congo

Expériments with *Hevea*, *Funtumia* and *Manihot* have been continued at the old Agricultural Stations, and new plantations are now being formed where the climate is suited to one or other of these species. The rubber plant now most extensively grown in the State plantations is the *Funtumia elastica*, or Ireh, the number so far planted being 3 460 800. The State has decided to extend the cultivation of *Hevea brasiliensis*, and has already begun with 30 000; it also proposes to increase the cultivation of *Manihot Graziovii*.

Some trial plantations of new rubber trees have been made, less extensive than the former ones, but they seem likely to be remunerative. The most notable species used are *Castilloa* and several varieties of *Manihot* and *Ficus*.

Arrangements have been made to introduce into the Congo improved apparatus for the coagulation, washing and drying of rubber, similar to that in use in the Malay States.

Encouraging information comes from the old plantations of lianas affording rubber; it is expected that in a few years' time a large number of these plants will be yielding an appreciable crop.

The chief cacao plantations in the Colony are at Coquilhatville and Barumbu, and number 92 000 plants. The State coffee plantations at present cover 600 hectares, mostly situated in the district of the Equator and the Aruwimi.

The natives are continuing experiments with cotton in the Lower Congo. Instructions have been given to the heads of the agricultural depots to increase the number of textile plants, which seem likely to grow in the arid climate of this region. The textile Agaves, the Sanseverias, and the Manila banana (*Musa textilis*) are amongst those suitable.

The most promising trees for this Colony are the cocoa palm and the *Elaeis*. The Government is at present studying measures for persuading the natives of the Lower Congo to start plantations of the *Elaeis* every year in the neighbourhood of their villages.

EGON FREIHERR VON RAMBERG. **Agriculture in the Transvaal.** (Johannesburg). *Berichte der k. k. Osterr. Ung. Konsular Aemter*, Wien, Nov. 1910, pp. 5-6. **16**

South African Union: Transvaal

Stimulated and helped by the Department of Agriculture, farming is making progress in the Transvaal, as it is in every part of the South African Union.

The value of the Experiment Fields of Potchefstroom, Ermelo and Standerton in the Transvaal, and Tweespruit and Grootvlei in the Orange River Colony, is generally recognised. The Department of Agriculture has started a Division for Vegetable Pathology to assist farmers in the war against vegetable parasites, and the Veterinary Department is doing everything to second the efforts of agriculturists to control the diseases of animals. The most formidable of the latter are the East Coast Fever (*Ostküstenfieber*), which has been doing great havoc among cattle for years past, and sheep scab.

In conjunction with other States of the Union, the Transvaal Government has started an energetic crusade against locusts.

The Agricultural State Bank makes loans to farmers.

The following table is taken from the Statistics of the Department of Agriculture:

	1st half-year 1909	1908
Cattle	899 673	566 533
Horses	58 249	55 933
Mules	18 285	9 011
Asses.	49 447	26 510
Sheep for wool	1 935 554	1 777 360
Other sheep	1 076 352	1 032 693
Angora goats	214 105	178 315
Other goats	1 437 785	1 347 390
Maize, bags	1 876 197	1 437 834
Coffee »	197 865	113 605

Ostrich farming and cotton and rubber plantations progress very slowly. The production of tobacco rose to 3 million English lbs (13 590 metric qs.) in the first half of 1909, the greater part of it being grown in the district of Rustenburg The quality of the tobacco is also improving, as well as the quantity; in addition to pipe tobacco (such as Transvaal tobacco), the planters are now growing a very good kind for cigars and cigarettes.

17 W. J. Palmer. **Agriculture in the Province of the Orange Free State.** — *The Times*, Nov. 5th 1910, Supplement, p. 27.

South African Union: Orange Free State

The Orange Free State, which is situated on a high plateau 4000 ft.-5000 ft. above sea level, and has an area of 50 000 sq. miles, is well suited by its natural characteristics, climate, and geographical position, to white races.

From the point of view of the farmer, there are however advantages and disadvantages.

The chief of the former are:

1) Healthy climate for man and beast.
2) Productive soil.
3) Cheap labour.
4) Long harvest season for maize, the principal crop.
5) Profitable markets.

The disadvantages are as follows:

1) Uncertain rainfall.
2) Semi-tropical torrents of rain.
3) Hailstorms.
4) Locusts and other insect pests.
5) Stock diseases.
6) Early and late frosts.

These difficulties are, however, not insurmountable. The rainfall may be supplemented from subterranean sources by means of bore-holes, of wind-mills and oil-engines, or springs may be opened up, river-water used for irrigation and stock, and reservoirs made. Taking the Province as a whole, there is no part where sufficient water cannot be obtained one way or another.

Without irrigation, three quarters of the area yield good crops of maize, Kafir corn, forage, roots and potatoes, when properly cultivated.

The damage caused by hailstorms to crops and stock is always of a local character.

The preventive measures advised by the Government, and carried out by the farmers, hold the locusts in check.

Cattle diseases and pests, where not due to culpable negligence, have, as a rule, been imported either from abroad, or from less healthy districts.

Horse sickness. — This is of little account.

East Coast fever has not made its appearance and it never spreads, even if introduced, in the high veldt.

The harm caused by frost can be easily avoided by the cultivation of crops which mature late and are resistant.

Maize. — The long harvest season for maize and Kafir Corn is most important. Maize sown up to December, ripens in April and May, and there follow for the harvesting four months of clear cold weather, the crops may thus remain in the fields till September without risk, which gives time for thorough drying.

In 1909 the Free State produced 200 000 short tons of maize.

Sheep, etc. — While the whole of the Free State is suitable for some kind of stock-farming, except in a very small area of the North-West, with sandy soil and coarse herbage, sheep-breeding can be made a valuable addition to farm-work.

A large number of Angora goats are reared in the more mountainous regions of the South East.

Poor woolled, but very prolific Persian and Afrikander fat-tailed sheep are seen all over the country and are being sought after by the butcher; they are very profitable to the breeder, for they thrive where, owing to the "Stick grass," woolled sheep cannot flourish, as the seeds of this grass catching on the fleece work into the skin.

Ostriches are being raised where lucerne (alfalfa) can be grown.

Irrigation. — This is necessary in the dry areas of the South and South-West, but water supply can nearly always be obtained either from dam spring, or bore-hole, sufficient to water as much as 50 acres.

Winter-wheat and oats for forage and hay are all grown on this irrigated land. Alfalfa grass is also being much cultivated.

The Department of Agriculture introduced, in 1904, the preparation of ensilage from maize, and many farmers practise it with success.

Trekking is no longer necessary, since the adoption of modern methods.

Wool. — On comparing the present agricultural condition of the Orange Free State with that before the war considerable progress is noticeable.

The Agricultural Department has been well seconded by the farmers. A good instance of the trust and co-operation of the latter was given in 1906 when the farmers subscribed £28 442 for the selection and purchase of Australian merino sheep. The following year, 1500 were imported, breeders paying for a stud-ram as much as £200.

In September 1905 a course of most successful lectures on wool-classing and packing was held throughout the Colony.

The sale of wool in the year 1910-11 will bring upwards of £1 000 000. into the country.

Government Experimental Farms. — These aroused much interest among farmers, who have greatly profited by the introduction of pure-bred sires.

Co-operative Creameries. — In 1905, the Department of Agriculture established and controlled a creamery on the Government farm Tweespruit, handing it over to a Co-operative farmers' Company in September 1907. It proved so successful that in July 1909 four creameries with an output of nearly 400 tons of butter were in working order. In June 1910, there were 7 creameries with a combined output of 1000 tons of butter.

These creameries have given great impetus to cattle-breeding and efforts for the improvement of milch cows.

Pork Factories. — Two of the creameries are considering the extension of their business to the pork industry.

Agricultural Societies. — These Societies have had much to do with agricultural progress in the Province, by holding annual shows (18 in the course of this year) which have greatly stimulated the spirit of emulation amongst competitors.

The Stud Breeders' Association has a well controlled stud book, which makes possible the registration of pure bred stock, while the Wool Producers' Associations (3 in number) and the Free State Agricultural Judges' Association have all done good work.

18 F. D. MACDERMOTT. **Agriculture in the Province of the Cape of Good Hope.** — *Times Supplement*, Nov. 5th., 1910, p. 24. London.

South African Union: Cape of Good Hope

Agriculture has made great progress in Cape Colony during the last few years, and in the western portion there has been a great increase in grain production.

Large crops of Rieti and Medeah wheat and of Texas and Algerian oats are being raised. Oats are a very important article of export, but hitherto it has been necessary to import wheat, a state of affairs which will however not last long, for every year the acreage devoted to the cultivation of this cereal increases, and vast schemes are being made for raising wheat under irrigation in the North Western district. On the Zak river, comparatively large crops have been obtained by private individuals by this means.

Quite recently, a large commercial company took up a block of country there, and is busy constructing works to hold up the flood waters in order to allow of the production of wheat on a large scale.

In 1909 the total output of wheat for the whole of the Province was nearly 3 000 000 bushels.

Much progress has also been made in the cultivation of barley (especially a good variety for malting) about 283 200 muids (a muid is about three bushels) were produced in the Province in 1909.

Maize is largely grown, but, being used for home consumption, little is exported.

The most important industry is stock raising, and Cape Province possesses more farm stock than the other three provinces of the Union put together. The main asset is the small stock, which consists of over 27 millions, including sheep and goats. The merino sheep produce about £ 3 000 000 worth of wool, per annum, and the revenue from the mohair of the Angora goats is about three quarters of a million. The flock masters spare neither pains nor money to improve their sheep: a few months ago one of the breeders paid 1 000 guineas for a Tasmanian ram which he had imported, together with other thorough-bred animals.

A very important side of the industry is the reintroduction of sheep into those districts from which 25 years ago they were driven by disease.

This region has excellent pastures and comprises nearly all the S. E. coast belt. The first impulse to this movement was given by the introduction of black-headed fat-tailed, hardy Persian sheep which have a natural power of resisting the dominant sheep malady (*Heartwater*).

The introduction of the Angora goat is one of the most important departures; the industry has been established in the Midland and Upper districts, and owes its existence largely to the enterprise of some merchants of Port Elizabeth which is the principal mohair market of the country. The problem the mohair growers have to solve is the production of the exact type and quality of hair which commands the highest price, and is in constant demand. For some years the producers have made experiments successfully in this direction. The South African Angora goat has acquired a great reputation and its exportation is forbidden.

Ostrich farming is another very important industry and in 1909 the rural population exported feathers to the value of £ 2 000 000. The farmer has not only domesticated these birds, but has greatly improved their plumage by judicious selection and mating, so that well selected breeding pairs often fetch high prices. The ostrich industry has, incidentally, given rise to important irrigation schemes, and has enabled thousands of persons to establish themselves on land which would otherwise have remained untenanted. The annual crop of feathers can easily be packed into a Cape cart drawn by two horses, whereas the transport of other produce often necessitates expensive methods.

Lucerne-fed birds give the best results, but they can also be fed on rape, on maize, or partly reared on karroo veldt (scrubby bush). An acre of lucerne will support three birds, and if in good plumage, they give three crops of feathers in two years.

Irrigation is practised in nearly every farm, while some districts, such as Oudtshoorn, rely almost entirely upon irrigation.

The dams are very simple, and range from a few stones packed with bush, to wire contrivances for the big rivers where the silt is too deep to permit the use of masonry.

Flood waters are often utilized, and lift irrigation is practised, while the veldt dam, the bore-hole and the well are all popular.

Viticulture, introduced by the early Dutch settlers, is a very important industry. In districts near the coast, the rainfall is sufficiently plentiful, but in Worcester and Robertson, irrigation is necessary. Owing to the attack of phylloxera in 1885, the vineyards have been planted with American vines.

Vine cultivation employs 80 000-100 000 people and in 1909 (in addition to hundreds of tons of fresh grapes sold) three and a half million gallons of wine, between six and seven hundred thousand gallons of brandy, and over 2 000 000 lbs. of raisins were produced in the Province.

Other agricultural industries, which are also progressing favourably, are cattle-raising (about 2 000 000 head), horse-breeding, fruit culture and dairies.

19 **Agricultural Production in Madagascar.** (Production agricole générale du Madagascar). — *Bulletin de l'office colonial.* Melun, No. 35, 1910, pp. 338-341.

Madagascar

India-rubber. — This crop in 1909 was four times that of the preceding year. It reached the value of 4 613 920 francs, Germany buying 2 600 000 francs' worth from the colony and France the rest.

Raphia, — The output has increased by more than 500 000 francs worth in two years.

Insect Wax. — The supply has increased nearly five-fold since 1896.

Cattle export is still on the decline partly owing to restrictions placed on Madagascar cattle by the Government of Mozambique. At the present time only the Islands of Réunion and Mauritius buy stock at Madagascar. The trade in hides, on the other hand, seems steadily increasing in importance.

Vanilla. — This crop has lately brought in an income of about 1 200 000 francs, which explains its increasing cultivation.

Coffee. — Is still little grown.

Cloves. — In 1909 the Island of Sainte-Marie had no crop owing to the cyclone.

Dry vegetables and Cape peas have been grown a little more. Cabinet woods, vegetable horse-hair, straw hats, tanner's bark, and rice in the straw, show no special increase or decrease in cultivation or export.

20 LORD NORTHCOTE. **" Climate " and Agricultural Development.** (Suggested Research Fund for Tropical Diseases). — *Nature*, N. 2140, Nov. 3, 1910, p. 28. London.

Great Britain

The *Times* of November 2 publishes an appeal which Lord Northcote has addressed to the Lord Mayor in favour of the allocation of a part of the fund raised for a London memorial to the late King to the establishment of an "*Edward VII. Tropical Research Fund.*" The late King, in his beneficent activity for the welfare of his people, was inspired by two ideals, peace for mankind, and war on disease. His work in the former of these directions has been recognised by the world at large; it is in following his lead in the second, that we think that a fitting tribute to his memory will be found.

Only recently, but now unmistakably, has Great Britain become alive to the vital importance of her tropical possessions. Their development proceeds apace, but at a heavy cost in human life and vital energy. Rarely does a mail arrive which does not bring sorrow into at least one home in these islands.

For generations, mankind have been willing to accept in a fatalistic spirit the death toll levied upon them by what was vaguely known as "the climate." Now this is no longer so. Thanks to the devoted labours of scientific men —among whom Englishmen hold an honoured place—we know in many instances what the enemy is, and how it is to be met.

Those who are not conversant with the subject will be surprised and almost startled to hear the effect on human life of measures taken as the result of such investigations. The following are illustrations drawn from the history of one of the greatest scourges of the tropics:

Malaria. — In Klang and Port Swettenham, two towns within the protected Federated Malay States, remedial measures were commenced in 1901. The deaths from malaria were in 1901, 368 and in 1905, 45. In the surrounding districts, where no measures were taken, the deaths for these years were respectively 266 and 351. In Hong-Kong remedial measures were commenced in 1901. In that year the admissions to hospital were 1294 and the deaths 132. In 1905, the admissions were 419 and the deaths 54. In 1904, the United States took over the administration of the zone of the Panama Canal; the deaths from malaria, which in 1906 were 821, had sunk in 1908 to 282.

Repression of Pellagra in Italy. Commission appointed by Government. — **21**
Ministerial Decree dated 15 November, 1910.

Science has recently formulated new views as to the causes of pellagra and its mode of transmission. In Italy, where pellagra still remains a problem of the first importance both hygienically and socially, there is great need of putting these views to an adequate and searching test, all the more, because, if they should be established, a change in the existing laws directed **Italy**
against this serious infectious disease would be rendered necessary.

Considering this, Signor Luzzatti, Premier and Minister of the Interior, has appointed a special Commission for the purpose of examining, by means of all needful experiments and researches, these new views on the etiology of pellagra and its prevention. The proposals they may recommend for adoption with reference both to the disease and to legislation on the subject, will be formulated in their report.

22 **The Italian Parliament and Pellagra in Italy.** (Lotta contro la pellagra in Italia. — *Atti Parlamentari*, Camera dei Deputati, Leg. XXIII, I Sessione, tornata 27 gennaio 1910).

The Hon. Caetani asked the Minister of the Interior whether he knew what results had been obtained by the English Commission for the study of pellagra, and what steps he intended to take.

Italy

The Hon. Calissano, Under Secretary of the Ministry, reminded the Chamber that the theory usually held in Italy, on which the existing legislation is based, ascribes pellagra to maize poisoning. Other theories, however, had been advanced, and other measures proposed. For instance, Dr. Sambon, of the Liverpool Tropical School, believed that pellagra was due to a protozoon inoculated by the insect *Simulium repens.*

But other researches and experiments did not tend to confirm this view. For this reason, the Minister of the Interior had appointed a special commission to study the question.

The Commission was of opinion that, at the present moment, there were no data sufficient to justify any change in existing legislation, however much they regretted the difficulties in the way of its application; but at the same time, they recommended that the investigation now in progress should be continued.

The Hon. Caetani expressed his belief that recent researches tend to weaken the maize theory. He called attention to the fact that pellagra is found exclusively in certain districts, and not in others, where, nevertheless, maize of all qualities is consumed; and referring to the fact that the disease attacks persons who are known never to have eaten maize, he said that he was inclined to attribute the cause of pellagra to a local agent as yet unknown, but closely connected with operations for soil improvement and with the distribution of drinking water.

As the question was of great economic importance, it was the duty of the government to intervene, not in a judicial, but in an auxiliary capacity. A special Commission ought to be appointed, composed of the most competent persons that could be found, but who were still quite unbiassed in their opinion.

The Hon. Calissano reminded the Chamber that the Commission had unanimously pronounced in favour of new experiments and researches. He remarked that between 1888 and 1908 the death-rate from pellagra was reduced from 117 to 39 per million of the population, the reduction becoming very noticeable after the law of July 21st, 1902, No. 427, at which date the rate was still at 80; while since 1905 it had dropped below 40.

Moreover in 1898 the percentage of pellagra patients in the lunatic asylums was 7,9; whereas in 1908 it had fallen to 3,5.

New Theories on Pellagra. (Le nuove vedute sulla infezione pellagrosa). — *Gazzetta Agricola*, Milano, anno XXIII, No. 49. Dec. 4, 1910. **23**

The characteristic feature of these new theories is, that they regard pellagra as a disease produced by an animal parasite, a protozoon.

Italy

Man is believed to be inoculated with this protozoon by the puncture of insects of the genus Simulides, so that pellagra is similar in origin to malaria, sleeping sickness, and such other infectious diseases as are due to the presence of protozoa communicated to man by the sting of certain insects.

These theories, recently upheld by several English writers and by Sambon, have acquired some notoriety and also authority. The idea is not however so new as is generally supposed, having been put forward in 1882 by Dr. Fabbri. The suggestion of the protozoic origin of pellagra then met with much opposition, and Professors Terni, Cabuzzi and other pellagra experts were decidedly against accepting the new theory.

If it should prove right, the whole campaign against pellagra would have to be revised. The present system is based on the maize theory, established by Ballardini and supported by Lombroso and numerous experts, which attributes the cause of pellagra to a poison contained in maize meal.

ANGELO CELLI. **Malaria according to Recent Researches.** — *La Malaria, secondo le nuove ricerche Eziologiche, Epidemiologiche, Profilattiche, ad uso dei Medici, Ingegneri, Agricoltori, Amministratori,* con tavole e figure intercalate nel testo. Quarta edizione intieramente rifatta. Torino, 1910, Pp. XVI + 384. Price 7 fr. **24**

This work was originally prepared from 14 lectures delivered by Prof. Celli, in 1899, in the Istituto d'Igiene, in the University of Rome. In his preface to the 2nd Edition the writer observes that the 1st Edition, exhausted in five months, was then already out of date, owing to the rapid strides made in the knowledge of the subject by the Italian Society for the Study of Malaria [Società Italiana per gli Studî della Malaria]. The 2nd Edition also rapidly out of date, was followed by a 3rd in 1903, and now by this, the 4th, in which the work has been entirely recast.

The book is divided into three parts, specified in its title.

The first 56 pages are devoted to the Etiology of Malaria under the following heads; *Parasites causing Malaria*, their generation and action in the blood in various forms of Malaria infection; *Methods for examining Malarious blood; Other methods of diagnosis of Malaria infection; Mosquitos in general and those of Malaria in particular; Capture, conservation and transport of mosquitos.*

In Part II, or Epidemiology, Professor Celli gives a rapid glance at indications of the probable existence and virulence of malaria from the dawn of history onwards, showing how, with the progress of agriculture it always tended to disappear. Coming to recent times, he shows its decline in England, Germany, France, Holland, Hungary, and in parts of Italy; and its persistence in Maremma and all Southern Italy, in Russia, Greece, the Balkan States, the Austrian coast of the Adriatic, Spain and Portugal, where very little improvement has taken place.

An interesting table is given, at pag. 289, comparing the consumption in Italy of State-quinine with the malaria death-rate:

Financial year	Quinine sold Kilogr.	Net profit — francs	Solar year	Deaths by Malaria
—	—	—	1900	15 825
—	--	—	1901	13 358
1902-03	2 213	34 000	1902	9 908
1903-04	7 234	183 038	1903	8 513
1904-05	14 071	183 382	1904	8 501
1905-06	18 712	296 295	1905	7 838
1906-07	20 723	462 280	1906	4 781
1907-08	24 351	700 062	1907	4 160
1908-09	23 365	769 809 (1)	1908	3 463

(1) Including the profit due to quinine-exportation to Greece.

Malaria mortality has therefore diminished in Italy by more than $^4/_5$ from 1900 to 1908, viz. from 15 865 deaths in 1900 to 3463 in 1908. Calculating per million of population, the diminution is given by the difference between 449 and 102.

Prof. Celli points out the enormous economic loss to the country through deaths from malaria: non cultivation of extensive regions, State indemnity to employés working in malarious districts, and emigration induced by malaria.

The author shows that the connection between mosquitos and malaria was a popular conception as far back as the times of Columella and Varro; the natives of Eritrea have the same word, *Mbù*, for malaria and for mosquito.

He cites examples of places infected by *anopheles*, where malaria is unknown, observing that the connecting links between marshy land, *anopheles* and malaria are still to be determined, and ardently invokes further research. He quotes cases of natural and artificial immunity, which should encourage research in a direction other than that followed for bacterial infection, which so far has proved useless against malaria.

Prof. Celli has made an exhaustive study of the conditions of the Agro Romano, or Campagna, as to three principal factors: soil, water, air, and shows how, owing to special geological conditions, there is a perennial substratum of water not far below the surface, in Rome itself, and in the entire Campagna, which is easily brought to the surface by any excess of rain on the surrounding higher levels, and forms stagnant pools which become breeding places for anopheles.

He examines the supposed connection of rice fields and other cultures by irrigation in various parts of Italy, and of *maceri* for retting hemp or flax, with the prevalence of malaria, and shows how neither the irrigation nor the macerating tanks are in themselves causes of malaria, but little accumulations of neglected water, formed accidentally during irrigation and maceration.

Speaking of the influence of trees, he demonstrates that the woods on high lands should be maintained "because it is certain that if the woods in the high regions whence streams flow are destroyed, with every heavy rain there will be flooding in the plains; on the other hand, in low and level lands where there is malaria. woods, according to Prof. Celli, favour the development of the epidemic.

Prof. Celli goes on to examine the connection of meteorological influences, of temperature, of social and economical conditions, of alimentation, habitation, clothing, labour, and finally of education, with the persistence of malaria, showing that generally where these conditions are least favourable to man, there malaria is most prevalent. He describes the miserable conditions of the vast hordes of poor workers who migrate, at the seasons of heaviest work, to the rice-fields of Lombardy or to the harvests in the Agro Romano.

Part III. Prophylaxis of Malaria, treats of all the known means of combating infection, chief and most efficient of which is quinine.

The Italian Parliament has set the example of legislation for malaria, with regulations for the distribution of State quinine either gratuitous, or at a low price, and for other measures of precaution and defence.

It is recognised that the reduction, by the law of 1907, of the working day in the rice fields, to 8 hours only, with intervals of rest, together with obligatory rest on Sundays, has had a most beneficial influence in diminishing the mortality from malaria.

Prof. Celli further advocates strenuous personal teaching at every point of contact with the work people in malarious districts: "the doctor, the engineer, the farmer and the school-master should join hands to effect and to maintain colonisation" in the Agro Romano; it has already been initiated in other parts of Italy, even in the South and in the Islands.

In this III Part, Prof. Celli gives many examples of the reclamation of land, systemisation of water courses, *colmate*, etc.

The book is completed by an extensive Bibliography of Roman Malaria, arranged in chronological order.

25 **Congress of Vine Growers at Montpellier.** — *Progrès agricole et viticole*, n. 47, Montpellier, Nov. 20, 1910.

France

The previous Congresses of vine growers organised during the phylloxera crisis at the Montpellier School of Agriculture, by the Central Agricultural Society of Hérault, pointed out with well known success the rules to be followed in replanting vineyards. But new questions have arisen since then. There is a demand for vines that not only yield regularly an abundant crop, but also one of the highest quality, so that the wine may deserve and retain the favour of the consumer.

The new Congress that is to be held by the Central Agricultural Society at Montpellier on May 18th, 19th, and 20th, 1911, to which all French and foreign vine growers are invited, will therefore mainly deal with the question of quality.

The following are some of the points that will be studied:

I.

1) The influence of the physical condition and chemical composition of the soil on the growth of the various American grafted vines, and on the quality of the grape and of the wine.

2) The influence of nitrogen, potash, phosphoric acid and lime on the vegetation and health of the vine and on the quality of the wine.

3) New nitrogenous manures. Stimulants. Can chemical manures be substituted for organic manures? If not, why?

4) The influence on production and on the quality of the grape and the wine, of pruning and stripping the leaves. The conditions under which they are efficacious.

5) Re-planting of grafted vines. May vineyard be planted on vineyard? Comparative value of graft-bearers to be used in re-plantations. The graft-bearers of dry, calcareous and non-calcareous soils, and of hot countries. Their influence on the robustness and fertility of the vine and on the quality of its products.

6) Present state of the question of direct producers. The results that they have given in the various vine-growing districts. Their resistance to cryptogamic diseases and to phylloxera. Defects and qualities of their wines. Conditions under which they may be utilised.

7) Cryptogamic diseases: *Mildew*. The reasons for the inefficiency of cupric treatments. Rules to be followed in the application of cupric mixtures and powders. The new remedies against mildew. *Oidium*. Progress realised recently in the knowledge of this disease and the means of combating it. Various remedies. Other diseases, etc.

8) Insects: the *Cochylis* and the *Eudemis*. New studies on the habits of these insects. Investigations as to the means for their control. Rules to be followed. The *pyralis*. New remedies.

II.

1) New methods of wine making. Combined use of sulphurous acid and yeasts; the part these play. Results obtained. Conditions of success.

2) Influence of length of fermentation on the constitution and quality of wine.

3) Variations in the composition and quality of wine according to production, intervention of diseases, etc.

4) Method of preparing liqueur wines.

5) The concentration of must; its economic importance. Results obtained. Conditions of application.

6) Conditions for ageing brandy.

III.

1) The international repression of fraud.

IV.

1) Crops which may be associated with the vine in times of crisis in various countries.

2) Present state of vine cultivation.

V.

Various communications.

Fifth Dry Farming Congress held in Spokane, Washington State, U. S. Endowment Fund to extend the Work. — *The Dry Farming Congress Bulletin*, No. 20, Vol. III, p. 417. 26

United States.

The Fifth Dry Farming Congress held in Spokane, Wash., October, 3rd to 6th, was attended by 1200 or more delegates and by hundreds of visitors. The chief features were:

True conservation — the conservation of soil moisture — as distinguished from "political" conservation.

The desire for the truth in farming, practical as well as theoretical.

The uplift of humanity, through lessening the burdens of the struggling and oppressed, and improving farm life.

The education of boys and girls in agriculture, the greatest of all industries.

The restoration of waste places and the cultivation by scientific methods of "bad" lands, to feed the increased millions of the future.

The need for assistance by the Federal Government and cooperation in conquering the forces of nature and making them subservient to the needs of man.

The world-wide need for increased production of the necessities of life at a reasonable cost.

The keynote of all was Education.

Scope of Congress Broadens.

It was the greatest and most important convention of agricultural leaders and farmers of the year, and the practical farmer predominated. Some of the ablest educators of the United States and Canada made telling addresses, and several of the brightest minds interested in agricultural development of Europe, Asia, South America and the Canadian provinces were heard in the discussions. All united in the opinion that dry farming had passed from the experimental stage into that useful period when greater things were to be looked for, and that what had seemed a miracle-working method, would be adopted as the general system where results were sought.

Pyoposed Endowment Fund.

It was decided to inaugurate a plan to obtain a $500 000 permanent endowment fund, the interest on which would permit of the extension of the scientific and experimental work and the publication of dry-farming reports and literature in several languages, and also provide permanent central head-quarters from which all documents could be disseminated, and where frequent conferences between agricultural experts and practical farmers could be held.

27 **Agricultural Exhibitions in the Netherlands in 1911.** — *Feuille d'informations du Ministère de l'Agriculture.* Paris, Déc. 20, 1910.

Netherlands

The following Exhibitions are announced for 1911 in Holland:

1) A Fruitgrowing Exhibition at Ruremond, Limburg;
2) A General Agricultural Exhibition at Amersfoort, Utrecht;
3) A Fruitgrowing Exhibition at Elst, Guelders;
4) A General Agricultural Exhibition at Middelburg, Zealand, organised by the *Zeelandsche Maatschappij van Landbouw* (Zeeland Society of Agriculture).

28 **The American Library Association and the Circulation of Agricultural Literature.** — *Experiment Station Record, U. S. Department of Agriculture,* Vol. XXIII, Nov. 1910, No. 6, pp. 501-507.

United States.

A recent gathering of considerable interest to workers in agricultural Science was the Agricultural Libraries' Round Table, held in conjunction with the annual conference of the American Library Association last summer at Mackinac Island, Mich. Various agricultural college and experiment station libraries and other extension agencies engaged in farmers' library work, were represented at this meeting, as well as others interested in the collection and circulation of literature dealing with this Science.

The programme included both papers and lectures and while some of the subjects dealt with the more technical details of library management, others discussed the broader phases of the relation of these libraries to other means of agricultural propaganda. Among the topics considered were the means of popularizing agricultural literature. the place of such literature in the general reference library, the instruction of students in the use of agricultural and other scientific literature, the selection and preservation of agricultural and bibliographical periodicals, and other aids to agricultural knowledge, and similar questions of wide interest and importance.

The meeting is believed to have been the first attempt to assemble the scattered, but rapidly increasing numbers of workers in the comparatively new field of agricultural bibliography. As was to be expected, it called attention to some of the problems which all workers in this field have to face, and to the advantages to be secured by their discussion. At the close of the conference, in response to a general desire for future meetings, steps were taken towards the permanent organization of an agricultural library section of the American Library Association. Should these efforts be attended with success, another helpful auxiliary to agricultural Science will be added to the long list of specialized associations which have come into being within the last few years.

A. MAGNIN. **The Mycological Office at Besançon, France, and Service for the Examination of Edible and Poisonous Fungi.** (L'office mycologique et le service de détermination des champignons à Besançon, France. Brochure in-8°, 19 p., 1910). — *Bulletin de la Société botanique de France*, t. LVII (4ᵉ série, t. X), 1910. 6 Séances d'octobre 1910. Paris, pp. 469-470. **29**

France: Doubs

Thanks to the initiative and perseverance of Dr. Magnin, Besançon possesses a *Mycological Office* at the Botanical Institute.

Here, on fixed days and hours, competent members of the Natural History Society of the Department of Doubs place themselves at the disposed of the public, for determining the species of fungi brought for their inspection, and giving information on their use as human food.

An account is given of the founding of the Office (the vitality of which is clearly demonstrated by the encouraging results already obtained) and stress is laid upon the service it renders to mycologists and students, as well as to the public.

The pamphlet also contains a list of mycological publications by botanists of Besançon and Franche Comté.

30 S. RAMULT v. BALDWIN. **Agricultural Instruction in Belgium.** (Das Landwirtschaftliche Unterrichtswesen in Belgium). — *Mitteilungen der Fachberichterstatten des k. k. Ackerbauministerium.* Wien, N. 17, 1910.

There are in Belgium 200 000 young men, sons of farmers, of whom 6000 attend Agricultural Schools. But the proportion increases every year.

The Department of Agriculture has voted, in the Budget of 1910, nearly **Belgium** a million francs for agricultural instruction.

In Belgium, more importance is attached to the capacity of the Professor, than to the School curriculum, and agricultural instruction, which is general in this country, must be considered as exceptionally good. It is imparted in three ways, by instruction in schools devoted to this subject, by complementary teaching in other schools, and by the diffusion of agricultural knowledge throughout the country.

There are three classes of Agricultural Schools: Primary, Middle, and High.

Primary agricultural instruction is given in the village schools, to which are often annexed gardens for practical teaching.

Further the Government subsidizes *Elementary Courses in Agriculture* which are held in the winter and night schools, and are open to children who have been through the Elementary School curriculum.

These courses consist of 25 hours of instruction in breeding of domestic animals, 25 in agriculture, and 10 in rural economy and book keeping.

Secondary Agricultural Instruction is imparted in the secondary schools, also in other schools where Agriculture is an accessory subject, in Lycées and technical schools. The best are those of Carlsbourg, Louvière, and de Huyt.

Accessory agricultural instruction consists of 5 hours theoretical and 5 hours practical work per week. Belgium possesses 15 of these semi-agricultural schools, and 35 hours per annum are devoted to agricultural instruction in the 80 Lycées.

Higher Agricultural Instruction has been rendered celebrated by the school of Gembloux, which possesses 65 hectares of ground, and cattle to the value of 60 000 francs. The teaching is both theoretical and practical. The students are either boarders or out-students.

Louvain has a Faculty of Agriculture attached to its University.

Brussels possesses a *School of Veterinary Medicine and of Agriculture.*

The *Agricultural Courses for adults and farmers* and the *Course of Agriculture for soldiers*, are also very well attended.

The institution of travelling Professors (*Agronomes de l'Etat*) which resemble the Austrian *Wanderlehrer* should be mentioned.

Progress in Agriculture in the Russian Empire. — *Modern Miller.* Dec. 10th, 1910. St. Louis, p. 27. 31

Russian Empire

The American Consul at Moscow reports that the Imperial Agricultural Museum, in its endeavour to popularize the study of agricultural subjects, has, for the last few years, conducted at the Museum in St. Petersburg, a free course of lectures on this science.

In addition to this course, popular lectures are delivered, and conferences held for men in the lower ranks of the army.

In the experimental department of the Museum, trained mechanics give practical lessons in the taking apart and putting together of various machinery, which is also exhibited in motion, and the use of agricultural implements is explained; experiments are also made with all kinds of farm machinery, such as traction engines, winnowers, sorters etc.

The attendance at these lectures has been increasing from year to year, rising from 5093 in 1906 to 17 808 in 1902 to 32 442 in 1908 and to to 60 346 in 1909.

The lecturers arrange with the students for excursions to visit shows and farms.

The lectures deal with the following subjects: elementary chemistry, elementary anatomy, physiology of plants, improvement and cultivation of the soil, agricultural meteorology, rural economy, seeds, agricultural implements, etc.

E. ROBYNS DE SCHNEIDAUER (Belgian Consul at Porto-Alègre). **Breeding and Agricultural Instruction Station in the State of Saint Paul, Brazil.** — *Recueil consulaire publié par le Ministère des Affaires étrangères du Royaume de Belgique,* T. 151, 1re Livr,, pp. 28-29. Bruxelles, 1910. 32

Brazil: St. Paul

The necessity has long been recognised of developing the cattle raising industry and improving the native breeds (1). With this object the Government founded a central Breeding Station at St. Paul in 1904. This establishment, which is very well equipped, has all the necessary arrangements for acclimatisation experiments with foreign breeds, the selection of native breeds, crossings, the cultivation and testing of fodder, dairying etc.

In 1909 there were at the Station 125 cattle, a dozen stallions, fifty pigs and several species of sheep. The crossing of Flemish cattle with the native breed has given good results; the half breeds seem particularly suited for the production of milk for market. In 1909, the *fazendeiros* of the State sent 245 cows and 225 mares to the Station to be covered. The State also shares the expenses incurred by private persons in the introduction of pedigree animals, the number of which, however, is so far not very large.

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(1) The Brazilian oxen, the issue of primitive and isolated herds, probably native, are very small, and their net butcher's weight is no more, on an average, than 400 lbs (181.2 kg.). These animals are remarkable for their immemse horns: one of these horns was found to have a capacity of 5 or 6 quarts (5.68 or 6.81 litres). (J. C. OAKENFULL, *Brazil in 1910.* Devonport, 1910, p. 183). [*Ed.*].

The Government of the State of St. Paul has for a long time been organising agricultural instruction. A special course of agriculture is being given at the Polytechnic School of St. Paul. There are also schools for agricultural apprentices at Iguape and St. Sebastiaô, which mainly concern themselves with tropical cultivations.

The Agronomical Institute of the State is at Campinas; it has a laboratory for the analysis of soils, agricultural products, manures, etc.; and an experimental section for cultures and agricultural implements.

33 **W. R. Fisher.** — *Nature*, Nov. 24, 1910, p. 113.

W. R. Fisher, Assistant Professor of Forestry at Oxford, died on November 13, 1910.

Great Britain.

Mr Fisher has left his mark upon forest science and practice. At Dehra Dun, in India, he taught chiefly forest botany, and he brought out a volume on plant physiology. At the Indian Forest School at Coopers' Hill, in England, he taught silviculture, forest protection, and utilisation. He assisted Sir W. Schlich in bringing out the latter's "Manual of Forestry", of which he undertook the preparation of vol. IV on "Forest Protection", and of vol V, on "Forest Utilisation", now in their second edition. Although these two volumes are adaptations of Hess's work on protection, and Gayers's book on utilisation, Fisher's books are more valuable than the original works, since he adapted the material to British and Indian conditions. They may be considered the standard works on the two subjects.

Throughout his life, Fisher was an active writer, and it would be difficult even to enumerate the many articles on forestry which he published. He was an active member, and president for two years of the Royal English Arboricultural Society, and editor of the Society's *Journal*. After his arrival at Oxford, he started an arboretum of indigenous and exotic trees on land belonging to Magdalen College.

34 G. MARTINET. **Professor Dr. A. Kraemer.** — *La Terre Vaudoise*, 2^{me} année No. 49, Déc. 10, 1910. p. 513. Lausanne.

Switzerland

Dr. A. Kraemer, formerly Director of the Agricultural Division of the Federal Polytechnic School of Zurich, died on December 2nd, at the age of 78.

He was born in South Westphalia, and his father was a well known agriculturist. After a brilliant career in the schools, and later, as professor, he was appointed at Darmstadt in 1865 permanent Secretary of the Agricultural Associations of the Grand Duchy of Hesse. In 1870, he was offered the Direction of the new Agricultural Division of the Polytechnikum then being instituted, and six months later, after considering the question at length, he accepted, on being pressed for the second time by Kappeler, President of the Council of the Federal Polytechnic School. The choice for this post had lain between Dr. Kraemer and Eugene Risler, later Director of the Agricultural Institute of Paris.

Dr. Kraemer was given two fellow workers in every respect worthy of him: Schulze and Nowacki.

The Agricultural Division, at first of little importance, soon began to develop under Dr. Kraemer's able direction, and at the present day, many of Kraemer's students and disciples are exerting considerable influence on the progress of Swiss agriculture.

Kraemer's activity, however, was not confined to his teaching and his many writings. He took part in the institution of the Station of Agricultural Chemistry and Seed-testing, attached to the Polytechnikum; in the revision of the Federal Agricultural Legislation of 1884, which was made in 1894; in the organisation of the Swiss system for encouraging the improvement of cattle; in the creation of Winter Agricultural Schools; in the institution of Agricultural Associations and Syndicates, of Peasant Secretarial Bureaus; in the drawing up of Customs Tariffs, etc.

It may be said that Kraemer was always in the van of agricultural progress. He gave himself up entirely, with his great capacity for work and his fine intellect, to the service of Swiss agriculture. He sowed generously, and that the harvest is likely to be rich was evident at the Lausanne Agricultural Exhibition, the success of which was so largely due to him directly and indirectly.

He lectured chiefly on rural economy and cattle breeding, in which subjects he stood without a peer and was considered an authority in Europe.

Agriculture. — Agricultural Physics, Chemistry, and Botany.

35 A. STUTZER. **The Progress of Vegetable Chemistry and Physiology during the Past two Years.** (Fortschritte auf dem Gebiete der Agrikulturchemie). — *Chemiker Zeitung*. Cothen, XXXIV Jahrg., No. 133, November 8, 1910, p. 1181.

Germany

E. Schultz has been continuing his investigations on the chemical constitution of the seeds, tubers and fruits of cultivated plants. J. Stoklasa's researches on the chemical nature of root secretion have shown that roots secrete carbon di-oxide only, and no other acid, either organic or inorganic. The more tender the roots, the greater the quantity of carbon di-oxide they give off.

Max Wagner's experiments show that the absolute quantity of nutritive substances decreases a little before the plants ripen, a part of it returning to the soil: this is especially the case with potash and nitrogen, phosphoric acid is not so likely to return. These observations confirm those previously made by Wimmer, A. Stutzer and L. Seidler.

It is thought that potassic salts, spread in the autumn, may protect the plants against frost, but they must be spread over the ground early enough for the roots to absorb and assimilate them. This problem has been studied by several experts, Freise and Prittwitz among others, but the question is not yet settled, and further study is necessary.

O. Thelen has continued his studies on the action of natural, artificial, and monochromatic lights on the development and formation of the constituents of certain cultivated plants, and he finds that the maximum production of vegetable constituents takes place under the yellow rays of the spectrum, in proximity of Fraunhofer's line *B*. The clear red rays of the neighbouring region of line *D* cause a small formation of vegetable substances, which is, however, superior to that caused by the red or dark red rays. The blue rays have no sensible influence, while the ultra-violet rays accelerate respiration and thus are harmful.

P. Konig has carried out some very extensive investigations on the subject of the poisonous action of chromium compounds on plants.

P. Leidreiter has made some important observations on the action of manganese on certain cultivated plants. Large quantities of manganese appear to be poisonous, and 0.025 gr. salt of manganese (expressed in metallic manganese) in a litre of nutritive solution, can be shown to have a deleterious action on oats. The action of a smaller quantity of manganese compound on oats, mustard, beets and potatoes is good; it increases the sugar in the beets, and the starch in the potatoes. There are traces of manganese in soils and plants, so that it probably exercises some physiological action.

Experiments in the selection of varieties of agricultural plants are entering more and more into the domain of agricultural chemistry, crops having to be analysed and manures studied with the object of selecting the best. Practical agriculture is still far from being perfect in this point; it is impossible to obtain good crops without abundant manuring, and very frequently the diversity of the soil is not sufficiently considered. W. Schneidewind has published some important works on this subject.

GRIG TUMIN. **Vegetation in Relation to the Nature of the Aqueous Extracts of the Soil in the District of Atbasar, Akhmolinsk, Siberia.** (Sootnochenie rastitelnosti z'dannimi Vodnik Vitiajek u Atbarskago Uiesda Akmolinskoi Oblasti). — *Xurnal opetnoi Agronomii.* God. XI, 1910, Kniga 5 T. pp. 704-717, St. Petersburg. **36**

Russian Empire: Siberia

These tests were made in that part of the district of Atbasar which is bounded on the West by Lake Dentr and extends South as far as Wera Kirei and Kiptschak. The average annual rainfall in this zone is about 8 inches (200 millimeters).

In testing the aqueous extracts of the soil the dry residues, chlorine, sulphuric anhydride and the degree of alkalinity are determined. The following table gives an idea of the relation between the vegetation and the nature of the aqueous extracts of a soil:

Predominant vegetation	Depth of soil	The aqueous extract of 100 parts of soil contains:			
		Dry residue	Chlorine	Sulphuric anhydride	Alkalinity
Festuca sulcata and Stipa capitata . . .	1 ft	less than 0.2 %	less than 0.02 %	—	less than 0.05 %
	2 ft	0.2 %	0.05-0.06 %	up to 0.02 %	0.05-0.07 %
Artemisia maritima and A. bariciflora .	up to 5 c/m	less than 0.2 %	less than 0.02 %	—	less than 0.05 %
	5-10 c/m	0.2 %	up to 0.04 %	—	up to 0.4 %
	2 ft	2-2.7 %	0.4-0.7 %	0.6-0.8 %	less than 0.05 %
Brachylepis . .	up to 5 c/m	0.2-0.4 %	0.08-0.13 %	—	0.06-0.08 %
	2 ft	2.8 %	0.9 %	0.7 %	less than 0.05 %
Salicornia Sueda et, al.	less than 2 ft	2-4.5 %	0.9 1.4 %	0.2-1 %	less than 0.05 %

As may be seen from the above table, the saline content of the soil varies according to the depth, so that the plant has to adapt itself to the various conditions which the roots encounter in penetrating the soil. Thus, at a depth of two feet, *Artemisia* and the *Gramineae* are unaffected by a salinity which they could not support in a more superficial layer.

The examination of the aqueous extracts, however, must not be separated from the determination of the quantities of sulphate and carbonate of lime, which, according to the writer, increase the power of resistance of the plants.

37 K. K. GEDROIZ. **On the Action upon Plants of Acids, Alkalis and some Inorganic Salts.** (Materiali K'Voprosu o Viliianii na Rasteniia Kislot, chtchelocéi i niekotorik nieorganitcheskikh solei). — *Xurnal Opetnoi Agronomii* (Journal d'Agronomie expérimentale), God. XI, Kniga IV, pp. 544-578, Kniga V, pp. 641-669. S. Petersburg. 1910.

Russia

Experiments on the action of acids, alkalis and various inorganic salts upon cultivated plants: flax, mustard, barley and vetch especially.

The plants selected were 5-10 days old and were placed in a nutritive solution.

Acids used: strong acids: sulphuric, nitric and hydrochloric; weak acids: phosphoric, oxalic, acetic, and citric in solutions of 0.0001-0.1 of the normal solution (1).

Alkalis: caustic potash of 0.06-0.0002 of the normal solution.

Inorganic Salts: Chloride of magnesium, potassium nitrate, calcium nitrate, of 0.5-0.01 of the norm. sol. Potassium sulphate of 0.2-0.01 (norm.). Potassium chloride and magnesium sulphate 0.1-0.01 of the normal solution.

Flax is the most susceptible to acids and alkalis and is affected by salts only a little less than mustard.

Mustard is in the second place with regard to the effect of acids and alkalis, but is the most susceptible to salts.

Vetch is less affected by acids and salts than either flax or mustard and resists the deleterious action of caustic potash longer, though it reacts to it sooner.

Barley, like oats, is remarkable for its resistance to acids, alkalis and salts.

The following tables give a clear idea of the activity of the various substances used: on the one hand at the maxima concentrations which the plants can stand (limit of resistance); on the other hand, the minima concentrations sufficient to kill the plants.

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(1) By *normal solution* is meant a solution prepared by dissolving in 1 litre [1000 cc.] of water a quantity of salt, acid, or other chemical compound, corresponding to its molecular weight expressed in grams. Thus, the molecular weight of potassium nitrate is 101; therefore its normal solution must contain 101 grams of salt to 1 litre of pure water. [*Ed.*].

MINIMA CONCENTRATIONS (NORM.) SUFFICIENT TO KILL THE PLANTS.

	Acids		Alkalis	Salts		
	Strong	Citric Acid	KOH	Mg SO_4	Mg Cl_2	Ca $(NO_3)_2$
Flax . .	0.001	0.002	0.01-0.005	less than 0.01	0.05-0.01	0.1-0.05
Mustard .	0.002-0.001	0.004	0.01-0.005	» 0.01	0.05-0.01	0.1-0.05
Vetch .	0.004-0.001	little more than 0.01	0.02-0.01	» 0.01	0.05-0.01	0.5-1.1
Barley .	0.004-0.002	» » 0.015	0.02-0.01	» 0.01	little more than 0.05	0.5-0.1

MAXIMA CONCENTRATIONS (NORM.) WITHSTOOD WITHOUT INCONVENIENCE BY THE PLANTS.

	Acids		Alkalis	Salts		
	Strong	Citric Acid	KOH	Mg SO_4	Mg Cl_2	Ca $(NO_3)_2$
Flax . . .	0.0002	0.001	0.0008-0.0005	less than 0.01	less than 0.01	0.1-0.05
Mustard .	0.0004	0.0015	0.001-0.0008	» 0.01	» 0.01	0.1-0.05
Vetch . .	0.006-0.0004	0.002-0.001	less than 0.0005	» 0.01	» 0.01	0.1-0.05
Barley . .	0.001-0.0008	0.006-0.004	0.001-0.0003	» 0.01	» 0.01	little less than 0.1

The first table shows that, with equal concentration, the action of weak acids upon flax and mustard is more intense than that of alkalis and salts.

On the contrary, sulphate of magnesium has more effect upon vetch and barley than caustic potash and citric acid.

The toxic action of strong acids is greater than that of any other reagent.

The second table shows that the four plants submitted to experiment are more susceptible to weak acids and alkalis than to salts.

Strong acids acted more energetically than alkalis on mustard and flax.

But with barley and vetch, on the contrary, no difference is to be observed.

Sulphuric acid and sulphate of magnesium in solution $^1/_{100}$ normal are dissociated almost equally, so that the acid solution contains about as many H (hydrogen) ions as the saline solution contains ions of Mg (magnesium).

Nevertheless the action of the sulphuric acid being more toxic, we must conclude that the H ion is far more poisonous than the Mg ion to plant tissues.

Similar considerations on the effect produced by caustic potash, sulphate of potassium, and nitrate of potassium, lead us to attribute higher toxic properties to KOH than to SO_4.

The pathological alterations in plants submitted to the action of acids or concentrated alkalis are: flaccidity of the roots; and a strangulation which extending rapidly to the whole stem, transforms it into a thin filament, while the leaves wither and die.

38 H. AGULHON. **Accustoming Maize to Boron.** — *C. R. Ac. Sc.* Paris, Décembre 27, 1910, No. 26, pp. 1382-1383.

Three series of experiments were made with maize in separate plots previously treated with boron to ascertain whether the seeds of vegetables cultivated in soil rich in boron would exhibit a certain adaptation to the presence of that element.

France

In the first plot no further addition of boric acid was made; in the second 3 grs. per sq. metre were added; in the third 12 grs.

Each piece of ground was divided into two equal parts. In the first ordinary maize was sown, in the second, seeds produced by plants grown in soil containing 2 grs. of boron per sq. metre.

In all plots, but in the third one more especially (that which contained the greatest quantity of boron), it was noted that plants grown from adapted seeds were more luxuriant than those from ordinary seeds.

It would appear therefore, that the seeds of plants grown where much boron was present, showed an adaptation to this element, and the resulting plants not only appeared better able to use the small doses of boron given to them, but also able to support more easily toxic doses than the control plants which had grown from unadapted seeds.

39 H. COUPIN. **On the Influence of different Volatile Substances on Plants.** (De l'influence de diverses substances volatiles sur les végétaux). — *C. R. Ac. Sc.* Paris, Déc. 1910, No. 23, pp. 1066-1067.

The above experiments are important not only from the point of view of physiology and phytobiology, but also from their bearing upon the destruction of insects harmful to plants.

France

Wheat was placed in saw-dust to germinate, and when the green shoots had reached a height of about 2 cm., the plants were placed under bell jars together with the volatile substance at a temperature of 15° to 22° C.

According to their observed effects the different volatile substances can be divided into the following groups.

1) *The plants were immediately killed:* Acetone, acetic acid, hydrocyanic acid, formic acid, sulphurous acid, amylic alcohol, ethyl alcohol, methyl alcohol, benzoic aldehyde, ammonia, benzine, bromine, bromoform, chloroform, ether, hydrosulphide of ammonim, sulphide of carbon, carbon tetrachloride.

2) *The plants died after having grown a little:* Essence of thyme, of wild thyme (*serpollet*), of eucalyptus, petroleum-ether, nitrobenzine, toluene, xylol.

3) *The plants died after considerable growth:* Formic aldehyde, chlorine, essence of turpentine, of rosmary, furfural, iodine, menthol, petroleum.

4) *The plants were not killed, but their growth was diminished:* Essence of garden balm (*Citronelle*, or *Melissa Officinalis*), of lavender, mineral essence, thymol.

5) *The plants underwent no modification:* Carbolic acid, camphor, ortho-cresol, creosote, clove essence, essence of patchouli, coal-tar, mercury, naphthalin.

Other cultures, treated a little differently, showed that volatile substances are more toxic to seedlings before they have made 2 cm. of growth and that the substances vary in their effects upon different plants. Thus, formic aldehyde, which is slightly poisonous to young wheat seedlings, is quite harmless to young lentil, helianthus and buck-wheat plants.

M. Molliard. **Action of the Intensity of Light and of Nutrition in the Formation of Cleistogamous Flowers.**—*Comptes-Rendus: Académie des Sciences*. Paris, Nov. 28, 1910, N. 22, pp. 990-991. 40

On placing plants of chickweed (*Stellaria media* Vill.) in lights of very different intensity, Vöchting has succeeded in obtaining open flowers (*chasmogams*) or closed flowers (*cleistogams*) at will. M. Molliard selected a place where the light was diffused, and only strong enough for the chickweed to give **France** cleistogamous flowers. Sterilized cultures of *Stellaria* were made in the same light conditions, some on pumice soaked in a mineral solution, and others on the same medium with the addition of 8 per cent of glucose. Whilst the flowers grown on the purely mineral solution remained closed, those on the glucose liquid opened wide their sepals and petals.

Those plants, therefore, which under normal conditions only produce closed flowers, may be made to produce chasmogamous flowers under the action of light by changing the conditions of nutrition.

41 P. GUERIN. **The action of Anaesthetics, Cold and Ultra-violet Rays on certain Plants.** (L'action des anesthésiques, du froid, et des rayons ultraviolets sur certaines plantes. — *Revue Scientifique.* Paris, 24 Décembre 1910, p. 804).

France

The fragrance of certain plants, such as Cruciferæ and the Cherry-Laurel, is not perceptible until the ferment and the glucoside are brought into contact, which is usually effected by crushing the tissues.

It has been proved that frost, anaesthetics and ultra-violet rays are all capable of decomposing hydrocyanic glucosides with the production of coumarin and with blackening of the leaves.

By promoting the catabolism of the protoplasm, the above agencies render possible free interchange of the cell contents, and thus the action of the diastases is no longer hindered.

42 W. L. HOWARD. **An Experimental Study of the Rest Period in Plants.** (*Missouri Stat. Research Bull.*, pp. 5-105); *Experiment Station Record*, November 1910, p. 526.

United States: Missouri

In studying the hardiness of the peach, it was found that this characteristic was intimately associated with the rest period. In order, therefore, to arrive at a better understanding of this aspect of hardiness, a study of the nature and principles of the rest period of plants in general was undertaken.

In this paper an initial report is made on the treatment for forcing into growth about 500 species and varieties of dormant (winter-resting) woody plants, including maples, chestnuts, alders, beeches, hickories, hackberries, dogwoods, hawthorns, elms, oaks, lindens, and fruit trees. It was found that external conditions determine both the time of occurrence and the degree of intensity of the rest period. If unfavorable conditions, such as cold or drought, occur at regular intervals, the plant readily adapts itself to these new demands, and resting becomes a habit which may continue to be repeated automatically for longer or shorter periods, and may become strongly fixed and apparently transmissible.

The results are given of a large number of experiments in shortening the dormant period, in which the following methods were tested: 1) Effects of warmth alone; 2) treatment with ether only; 3) freezing, etherizing, and the use of dark chamber; 4) etherizing, drying, freezing, and dark chamber, singly or in combination; and 5) miscellaneous and special tests, such as the use of chloroform, desiccating with alcohol, with salt solutions, and with sulphuric acid, etc. A careful study of the results of these experiments seems to indicate that while these various agencies may quicken the growth, they probably exert no specific action.

A bibliography is appended.

J. E. VAN DER STOK. **Account of the Results Obtained by the Crossing of *Zea Mays* L. and *Euchlaena mexicana* Schrad.** (Bespreking der Resultaten verkregen met de Kruising tusschen *Zea Mays* L. (maize, djagoeng) en *Euchlaena mexicana* Schrad. (*Reana luxurians*, Dur. = Teosinte) *Teysmannia*, XXI, 1910, pp. 47-59. Mit einer Tafel; *Botanisches Centralblatt*, Band 114, N. 18. Jena, Nov. 1, 1910, pp. 452-453. **43**

Java

As compared to *Zea Mays*, the *Euchlaena mexicana* (Teosinte) (1) displays great fertility and resistance to chlorosis, a disease which often attacks Java maize. But the *Teosinte* produces a small ear of little value.

It was thought that a very fruitful species, resistant to chlorosis and with a large ear, might be obtained by hybridization, but the hope was doomed to disappointment. The first generation of the hybrids was uniform and intermediate in type, but resembling mostly the *Teosinte*. Only intermediate forms were obtained in the second generation. the original characteristics having all disappeared; and even in the third and fourth generations, the fruitfulness and the characteristics of the ear remained intermediate, while the hybrids showed chlorotic symptoms in a marked degree.

H. BRIEM. **Seed Roots in Beet Raising.** (Die praktische Stecklingskultur in der Rübensamenzucht. — *Oesterreich Ung. Zeitschr. für Zuckerindustrie u. Landw.* XXXIX, J., 6 H., pp. 901-918 + figs. 8. Vienna, 1910. **44**

One of the greatest advances made in beet cultivation was the introduction of an intermediate generation of seed roots obtained from the carefully selected seeds of the so-called "mother" beets.

These seeds are sown in the spring, and the seed roots obtained therefrom in the autumn yield in the following year seed for the market.

Austria-Hungary

This practice has become necessary in order to prevent degeneration, and at the same time meet the demand for really good seed, which is constantly increasing, owing to the enormous development of beet cultivation. It is estimated that in 1906 Europe alone (to say nothing of America) required 42 million kgs. of beet seed.

The process however is not so simple as is generally believed.

Reliable seeds cannot be obtained by selection in the lump, nor from a single generation of "mother" beets followed by the cultivation of the seed roots. An individual selection must be made, the characteristics of which are assured by three generations. That is to say, six years are required to obtain seed of guaranteed quality for the seed roots; and another two years must pass before the market product is ready.

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(1) The *Euchlaena mexicana* or *Teosinte* is an annual grass of immense value for forage in the South of the United States. By many botanists it is considered the original form of Maize; it is also known under the name of *Reana luxurians*, Dur. This plant is described in the *Bull. 14 Div. Agrostology U. S. Dep. of Agriculture*, and also in the *Farmers' Bull.* 102. Experiments made at the Experimental Station of Louisiana show that *Teosinte* may yield as much as 50 tons of green fodder per acre (123 tons per hectare). See F. Lamson Scribner, in *Bailey's Cyclopedia of American Horticulture*, IV vol. London, 1902. [*Ed.*]

M. Briem gives in conclusion the most practical and convenient rules for the cultivation of seed roots and the harvesting of their seeds. When all the conditions are favourable, there should be from 28 to 30 quintals per hectare of seed fit for sale. Profit becomes doubtful, if the yield fall below 22 quintals.

45 MARIE KORSAKOFF. **Action of Sodium Selenite on the Production of Carbon Dioxide in living and dead Yeast Cells.** (*Berichte der deutschen botanischen Gesellschaft*, 1910, 28, pp. 334-338). — *Journal of the Chemical Society*, Nov. 1910, Abstr. ii 989.

Germany

Whilst a 1 per cent solution of sodium selenite completely checks the production of carbon dioxide from *zymin* (1), living yeast produces considerable amounts even in 30 per cent solutions. Small amounts of sodium selenite (0.1 — 0.5 %) even increase the activity of living yeast.

46 E. F. SMITH. **The Effect of Low Temperatures on Microorganisms.** — *La Revue Générale du Froid*, N. 19. Paris, Dec. 1910, pp. 720-721.

France

Up to the present, those microorganisms chiefly have been studied for which the temperature most favourable to their activity is about that of the human body (37° C.). But there are microorganisms which have to live in a temperature very close on 100° C. and others which live in great cold. One of the most notable of these is a *Torula* which according to Ralm, Brown, and Smith can live in butter at—6° C., even when the butter contains a large quantity of salt.

Mr. Smith draws the attention of instrument makers to the want of a convenient laboratory apparatus for producing a constant temperature less than 0° C., while average or high temperatures are easily obtained by the thermostat stoves. It ought (he says) to be quite easy to reach and keep a constant temperature of—15° C.

47 F. CAVARA. **The Action of Wind on Plant Development.** (Alcune ricerche intorno all'azione del vento sullo sviluppo delle piante). — *Bullettino dell'Orto Botanico della R. Università di Napoli*, Tomo II, Fasc. IV. Napoli, 1910, pp. 505-512.

Italy

This paper describes some experiments, the first of their kind, made for the purpose of testing the effect of wind on plant development.

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(1) Zymin is a stable acetone yeast, prepared according to a patent process from [illegible] yeast at low fermentation. See LAFAR, *Technische Mykologie*, IV. Bd. p. 362. [*Ed.*]

The investigation lasted from July 23rd to Sept. 27th 1910, and was carried out on the following plants: *Iresine Herbstii* Hook., *Coleus hybridus* Hort, *Aster chinensis* L., *Zinnia violacea* Cavan., and *Sempervivum Clusianum* Ten. An ordinary electric fan ventilator was used.

The result shows that the wind's action, if continuous, may bring about, in the short space of two months, profound changes as well in the form as in the structure and growth of plant organs. These changes tend to the formation of adaptation qualities such as, being acquired in the course of many generations, characterize the plants found in regions where the wind constitutes the principal œcological factor.

It was found also that the wind's action developed tendencies to evolve new properties and habits as regards the biological cycle; for instance, an annual plant may become a biennial, as in the case of *Aster chinensis.*

It is a remarkable fact that the *Iresine Herbstii* and the *Sempervivum Clusianum*, although they were treated in precisely the same manner, refused to show any tendency to variation as observed in the other plants; and how great this variation was, is well seen from the photographs appended to the article.

The original homes of these two plants are particularly wind-swept, and, as a possible reason for their intractability, it is suggested that, besides having a less plastic organism, these species may have already adapted themselves to life-conditions similar to those induced by the experiment.

E. Schaffnit. **The Effect of Low Temperature and Frost on the Plant Cell.** (Studien über den Einfluss niederer Temperaturen auf die pflanzliche Zelle). — *Mitteilungen des Kaiser Wilhelms Instituts für Landwirtschaft in Bromberg*, Bd. 3, H. 2, pp. 93-144. Berlin. **48**

This paper describes new observations and experiments made, chiefly on cultivated plants, during the winters 1907, 1908, 1909. The chief results (mostly new) were as follows:

Germany

I. With temperatures close to 0° C., chemical transformations take place in plant cells, which change unstable compounds into stable.

These alterations have only an oecological signification, i. e. they are an effect of environment upon the plants.

II. With regard to death from cold, plants fall into the following groups:

a) Somatophytes, that is, differentiated plants and plant organs, for which water in an absolute necessity.

b) Somatophytes which can stand a certain amount of desiccation without imperilling their existence (Algae, Mosses, etc.).

c) Asomatic organs, which can endure complete drying up (latent condition, seeds, spores, etc.).

In group *a*), death from cold occurs through the elimination of water, and also from the above mentioned chemical changes, and alteration in physical condition.

In *b*) and *c*), death is caused by vital reaction to external stimuli taking place at a minimum temperature, which is different for each individual.

Among many results of practical importance those obtained from experiments on 200 varieties of wheat should be mentioned.

These proved for wheat that there is no connection between morphological characters and resistance to cold: therefore structural differences are unimportant from this point of view, and all further research on the subject is useless.

49 L. G. DANILOV. **Weather Prognostication for the Russian Shores of the Black Sea.** (O Predskasanii pogodi dlia nujd tchernomorskago Poberejia). — *Met. Viest* (*Meteorological Bulletin*), 1909, Nos. 1-2. *Xurnal Opetnoi Agronomii* (Journal of Experimental Agriculture), God. XI, Kniga 5, p. 794. St. Petersburg. 1910.

Russia

Winter rains and storms, which so affect the progress of the crops in South Russia, are closely connected, in the writer's opinion, with the appearance of cyclonic zones, which move eastward from the basin of the Mediterranean, and carry winds and mist over the basin of the Black Sea.

If a good telegraphic service were attached to the various meteorological stations of the Mediterranean, the atmospheric variations likely to occur along the southern coasts of Russia could be known one or two days beforehand.

50 A. STUTZER. **Progress in the Study of Soils during the Last Two Years.** (Fortschritte auf dem Gebiete der Agrikulturchemie). — *Chemiker-Zeitung*. Cothen. XXXIV Jahrg, N. 133, 8 Nov. 1910, p. 1181.

Germany

E. Mitscherlich, P. Herz and E. Merres have proposed some new methods for soil analysis; for instance, as regards the determination of nitrogen.

It is advisable not to measure the total amount of nitrogen, but only the part soluble in water saturated with carhon dioxide; in this solution it was found possible to determine exactly 0.000012 gr. of nitrogen. The sample to be analysed was taken from each sq. meter of soil with a soil-borer.

In the domain of soil bacteriology Hiltner believes he has demonstrated that certain bacteria favour the formation of tubercles in the Serradella, (*Ornithopus sativus*). From the action of these bacteria the tubercles of the roots became enlarged, and left a greater quantity of nitrogen in the soil for the next crop.

Kròber has again shown that the soil bacteria possess in a high degree the property of rendering soluble in water phosphates not otherwise soluble.

Besides carbon dioxide these bacteria produce lactic, butyric, and acetic acids.

O. Lemmermann, H. Fischer and B. Busek have confirmed the preceding observations of A. Stutzer and W. Rothe, to the effect that bacteria and hyphomycetes form albumen more easily from ammonia than from nitrates. The bacterial albumen is decomposed in the soil after some time.

A. Baumann and E. Gully have made important researches on the subject of humic substances in peat. Up to now the existence of free humic acid in peat has been assumed. The phenomena which had been attributed to the action of this acid are in reality absorption processes through colloidal substances.

The colloidal substance of peat acts like the cellular membranes of living *Sphagnum;* in fact peat absorbs bases in proportions which are not stoichiometrical.

E. Haselhoff, in studying the decomposition of soil forming rocks, has found that Leguminosae extract from unweathered rocks a much larger amount of nutritive substances than Gramineae.

I. König, J. Hasembaumer and H. Meyering. **The Osmotic Pressure and the Electrolytic Conductibility of the Soil as Means of Judging its Quality**. (Bedeutung des osmotischen Druckes und der elektrolytischen Leitfahigkeit fur die Beurteilung des Bodens). — *Landw. Versuchs-Stationen.* Berlin, LXXIV Band. Heft I-II, pp. 1-56. **51**

Germany

The writers had previously made some preliminary investigations on this subject; in the present paper they describe the methods of investigation and the most convenient arrangement of the necessary apparatus, as well as the tests and controls to which they have submitted these methods in order to ensure exactitude in the results.

The osmotic pressure and the electrolytic conductibility of the soil must furnish a measure of the amount of soluble components of the soil with much more certainty and simplicity than extracts obtained by special solvents, because the latter are very unlikely to furnish results bearing on the conditions of the soil as found in the field.

The experiments were made on soils which had been submitted to different treatments. Some had been manured in different ways and left uncultivated, while others had been cultivated without manure for two years, so that they might become very poor.

The following conclusions are drawn:

1) The determination of the osmotic pressure, made at a constant temperature, gave good results, the oscillations observed being weaker than those obtained in the previous experiments.

2) The temperature of 25° C., which was formerly adopted, cannot

be recommended; because a strong diosmosis of the salts is produced at this temperature, and there are also other inconveniences.

The best working temperature is from 18-20°, 18° being chosen in this case.

3) The degree of the saline diosmosis in determining the osmotic pressure depends on the nature of the salts and probably also on the quality of the membrane used.

4) The determination of the electrolytic conductibility of the soil generally furnishes values which stand in close relation with the osmotic pressure, although an absolute agreement cannot be expected.

An increase of the osmotic pressure and of the electrolytic conductibility is however observed in all soils after manuring; while a decrease in both these values sets in with the progress of vegetation.

Both the osmotic pressure and the conductibility furnish an index of the degree of solubility of the plant foods contained in the soil. The conductibility can be determined more easily and quickly than the osmotic pressure; but the latter gives more exact results when the osmometers work well.

5) As the conductibility varies directly with the fineness of the soil, it is advisable that soils of an equal degree of fineness be compared.

6) These investigations serve also for studying the capacity of absorption in different soils. It has been found, for instance, that the potash and phosphoric acid of bi-potassic phosphate are completely absorbed when they are not used beyond a given limit, whereas with sulphates, only a part of the sulphuric acid is absorbed. As to chlorides and nitrates, neither their chlorine nor nitric acid are retained. There is no increase of conductibility in soil treated with potassic phosphates. which means that the phosphate does not remain in solution, but is absorbed.

7) If the quantities absorbed be compared with the amounts subtracted by the crops and considered in relation to a fixed quantity of nitrogen, it will be found that a soil which is rich in potash and deficient in lime has yielded a large amount of potash and very little lime, while the contrary is the case with the soil rich in lime and deficient in potash, which seems to show that these two bases are interchangeable in certain circumstances and up to a certain point.

8) There is an increase in the soluble nutritive substances of the soil through the growth of clover. This is shown by increase of the osmotic pressure, by the increase of soluble substances extracted after treatment by steam, and by the larger rye harvest of the next year.

R. O. E. DAVIS and H. BRYAN. **The Electrical Bridge for the Determination of Soluble Salts in Soils.** — *U. S. Dept. of Agriculture, Bureau of Soils, Bulletin* No. 61, pp. 1-36, + 5 Tables. Washington, 1910. **52**

United States

Stress having been laid on the utility of determining the electrical resistance of the soil and of the solutions found in it, a description is given in this article of an apparatus which combines in a practical form all the points previously found desirable, and which is easily manipulated.

The apparatus is specially adapted for determining the alkalinity, or rather, the excess of soluble salts which are often a cause of sterility of the soil in arid and semi-arid regions, and the percentage of alkalis in the soil may be determined on the spot, the registration being made at the same time as other records.

The instrument may also be used for the estimation of the salts content of irrigation and drainage waters, and in the laboratory it can be employed for determining the soluble salts of aqueous extracts of soil.

By following the instructions furnished by the *Bureau of Soils Bulletin*, any person who is accustomed to the use of electrical measurement instruments will be able to construct the apparatus here described.

On the Theory of Vital Action going on in the Soil. — *Research Work and Agricultural Literature.* Diplomatic and Consular Reports, No. 4554, London. 1910. **53**

Egypt

It has been known for some time past that the fertility of the soil can be greatly increased by the action of heat and of volatile antiseptics. Messrs. Russell and Hutchinson considered that the difference between treated and untreated soils was due to some factor, in the latter, which limits the number of bacteria, and therefore the rate of production of ammonia. They claim to have found in all soils so far examined numbers of protozoa and amoeba, which live on bacteria and so keep their number down to a low limit. This novel idea of the theory of vital acrion going on in the soil is not in accord with the results obtained at the Egyptian Agricultural School.

Mr. Fletcher, who has observed that the natives of Bombay in certain circumstances subject their soils to heat, finds that when soil is heated to 170° C. — a temperature high enough to destroy all the bacteria as well as the larger organisms — the fertility of the soil is greatly increased. He explains this by concluding that the effect of heat is to destroy gradually the toxic excreta in the soil. He regards the former explanation as incorrect.

54 C. Hoffman and B. W. Hammer. **Some Factors concerned in the Fixation of Nitrogen by Azotobacter.** — (*Centr. Bakt. Par.*; 1910, ii, 28, 127-129). —*Journ. Chem. Soc.*, Nov. 1910, Abstr., p. ii. 988.

Germany Experiments made with different soils showed that their nitrogen-fixing power varied from 0.15 to 14.47 mgr. of nitrogen per gram of mannitol consumed. Mannitol and lactose were shown to be the best sugars for maximum fixation in impure cultures, the fixation obtained with maltose and sucrose being very slight.

Mannitol and dextrin gave the best results with pure cultures, and sucrose also gave good results; lactose was very unsatisfactory.

Di-calcium and tri-calcium phosphates gave better results in impure cultures than mono calcium phosphate. The incubation period for impure cultures is from twenty-one to twenty-eight days; there may be losses of nitrogen if protracted beyond this period. Calcium carbonate need only be present in very small amounts.

The protein in the cells of Azotobacter varied from 8.31 to 19.13 per cent. the phosphorus (calculated as P_2O_5) varying from 2.51 to 2.97 per cent.

55 A. Koch. **Accumulation and Loss of Nitrogen in the Soil.** (Stickstoffgewinn und Stickstoffverlust im Ackerboden). — *Biedermann's Zentralblatt für Agrikulturchemie.* Leipzig, Nov. 1910, Heft 11, pp. 719-722.

Germany It has been observed that whilst the action of farm manure is sometimes greatly reduced by the work of denitrifying bacteria, in certain cases nitrogen is fixed in the albuminoid form by the action of other bacteria; whence the conclusion that the process of denitrification, or nitrate transformation, varies according to the conditions of the soil.

Moreover, the decomposition of nitrates in solutions liberates nitrogen, while suitable experiments have proved that in the soil the nitrogen is fixed by bacteria in albuminoid form.

Koch, continuing these researches, has found that in a clay soil containing not more than 25 per cent of moisture, and not too much sugar, only albuminoids are formed from nitrates by bacteria, and there is no loss of nitrogen.

But when there is upwards of 30 per cent of moisture, 82 per cent of nitrogen is given off.

Koch attributes the influence exercised by excess of moisture to want of oxygen, because the bacteria which decompose nitric acid obtain from it the oxygen they require by freeing the nitrogen whenever there is a lack of atmospheric oxygen. These losses of nitrogen are of special importance when the soil has been manured with farm manure or green manure, which cause considerable quantities of nitric acid to form in the soil, the organic substance being an abundant source of energy for the denitrifying bacteria.

One might infer from these results that bacteria which fix nitrogen in the form of albuminoids must predominate in soils containing a relatively low percentage of moisture, and that the denitrifying bacteria must predominate in very damp soils and in solutions.

The experiments made by Koch with pure cultures have, however, shown that the same group of bacteria fixed nitrogen in somewhat damp soils, and liberated nitrogen in very damp soils and in fluids.

The conclusion reached by A. Koch is very important, especially for soil bacteriology. He says that the subtle reaction of the bacteria on the physical condition of the medium in which they live makes it necessary to study the action of soil bacteria only in the soil itself as far as possible, if we are to find out what they are really doing there.

A. Koch's researches in connection with the power certain bacteria possess of fixing nitrogen in stable compounds by the help of sugar and starch, which lend them the requisite energy, have aroused considerable interest in the agricultural world; but at present they are of no importance for practical husbandry, because the use of sugar and other sources of energy in large quantities is far too costly.

A. Koch has therefore made every effort to replace sugar by another source of energy that could be adopted in practical agriculture. The first attempts to substitute cellulose for sugar gave negative results, but when Pringsheim succeeded in raising in pure cultures nitrogen fixing bacteria by means of cellulose, Koch resumed his studies, attributing the negative results he had previously obtained to the fact that the number of microorganisms with which he had experimented were insufficient to decompose the cellulose. He therefore made a preparation of nutritive solutions and thin paper strips, and inoculated this with mould, compost, sewage mud and manure separately. The decomposition and solution of the cellulose was rapidly produced by the action of the microorganisms. Fresh paper strips inoculated with the bacteria from these four cultures, were put in the soil which was to be used for the experiments, and a little grape-sugar was added as a further source of energy. The decomposition of the paper (cellulose) was only complete in the soil that had been inoculated with fresh manure. The increase in nitrogen per 100 gr. of soil was as follows:

Inoculation	with	mould	2.6	mg.	nitrogen
»	»	old farm-yard manure	3.9	»	»
»	»	sewage mud	0.0	»	»
»	»	fresh farm-yard manure	29.1	»	»

Koch therefore comes to the conclusion that nitrogen can be fixed in the soil with the help of cellulose whenever there is plenty of it, whether in virgin or in cultivated soil, in the form of plant debris. The soil must also contain the right kinds of cellulose-decomposing bacteria. These bacteria are generally absent, but may be introduced by means of farm-yard manure. We thus have a new explanation of the well-known power which this manure has of increasing the fertility of the soil, which was hitherto especially attributed to the nutritive substances introduced into the soil with the manure.

A. Koch explains the value of green manure in the same way, and concludes by saying that the addition of farm-yard manure to the soil neutralises the harmful denitrifying action of cellulose, by reversing its effect and transforming it into an agent for fixing nitrogen in the soil.

56 Th. Pfeiffer, A. Guttmann and F. Thiel. **The Balance of Nitrogen in the Soil.** (Der Stickstoffhaushalt des Ackerbodens). — (*Mitteilungen d. Landwirtschaftl. Institute d. Kgl. Universität Breslau*, Bd. V, Heft 5, S. 657); *Biedermann's Zentralblatt für Agrikulturchemie.* Leipzig, Dec. 1910, Heft 12, pp. 793-797.

Germany

Only the chief results of the experiments described in the above paper are given.

A) *Comparison of cultivated soil with soil lying follow, with reference to the nitrogen balance.*

A clay soil from Rosenthal was used in pots for the experiments; there were 18 zinc pots, divided into three sets, one set being left fallow, the second sown with oats and the third with mustard. Of the latter, three separate crops were obtained during the course of the summer.

The soil contained the following additional quantities of nitrogen at the end of the experiments:

Fallow	+ 0.901 ± 0.043 g.	Nitrogen
Oats.	+ 0.929 ± 0.038 g.	»
Mustard	+ 1.131 ± 0.042 g.	»

The soil used clearly showed that it could fix the atmospheric nitrogen in considerable quantities, while the soil left fallow did not in any way show the favourable action usually attributed to it in regard to nitrogen of the soil.

Among non-leguminous plants mustard occupies a special place as a nitrogen-fixer though it does not possess this property to the same extent as leguminosae.

B) *Influence of steam sterilisation on the nitrogen balance in the soil.*

Some experiments were made with oats, mustard and *fallow soil*, in Rosenthal clay soil in zinc pots as above; these were heated in an autoclave for two hours at a pressure of 3 atmospheres, and the following results were obtained:

The plants at first suffered in the usual way, but afterwards recovered. Sterilisation caused a loss of nitrogen in the soil, and allowing for this. the average value of the nitrogen balance was as follows:

	In sterilised soil		In non-sterilised soil	
Fallow . .	+ 1.031 ± 0.079	g. Nitrogen	+ 0.901 ± 0.043	g. Nitrogen
Oats . . .	+ 1.030 ± 0.038		+ 0.922 ± 0.038	»
Mustard. .	+ 0.853 ± 0.083	»	+ 1.131 ± 0.042	»

These figures show no uniformity in the nitrogen balance, but six series of experiments extending over two years make it almost certain that soil sterilisation improved the balance of nitrogen.

C) *Influence of carbon-disulphide on the nitrogen balance in the soil.*

It appears from the experiments made that the nitrogen balance is favourably influenced by the action of sulphide of carbon, but that this treatment does not improve the growth of plants.

D) *Influence of the addition of sugar on the nitrogen balance of the soil.*

The quantity of sugar used was 260 gr. to 13 kg. of soil, and the plants grown were oats and mustard. The results were as follows:

Oats	(without sugar)	+ 1.020 ± 0.114	g. Nitrogen
Mustard	(» »)	+ 1.056 ± 0.147	»
Oats	(with sugar)	+ 1.108 ± 0.042	
Mustard	(»)	+ 1.052 ± 0.072	»

The writer attaches no importance to these small differences, and considers that all the experiments made on this sugar question have failed to show that sugar improves the nitrogen balance, or affords an appreciable increase of production.

E) *Action of the soil algae on the activity of nitrogen-fixing bacteria.*

These experiments were made partly with sand and partly with Rosenthal clay, the algae developed in the former with much greater intensity than in the clay. A small accumulation of nitrogen was indeed verified in the sand, but as agricultural soil seldom provides the requisite conditions for the abundant development of algae, the latter should not be considered of great importance in fixing nitrogen in the soil.

O. SCHREINER and E. C. SHOREY. **Some Acid Constituents of Soil Humus.** — *The Journal of the American Chemical Society.* Vol. XXXII, No. 12. Easton, Pa. December, 1910, pp. 1674-1680. **57**

United States

The paper before us deals with the isolation of three acid substances from the organic soil complex, namely,

α Monohydroxystearic Acid, $C_{18}H_{36}O_3$; Paraffinic Acid, $C_{24}H_{48}O_2$; and Lignoceric Acid, $C_{24}H_{48}O_2$.

The isolation of three other acid substances, namely, picoline carboxylic acid, dihydroxystearic acid and agroceric acid has already been reported in the above Journal, and the fact that so many organic compounds, neutral, basic, and acid, have now been isolated, sufficiently proves the complex character not only of the humus, but also of the so-called humic acid.

The soil experimented on was the Elkton silt loam from Maryland. It is almost white, rich in clay and silt, and contains 0.53 per cent organic carbon and 0.066 per cent nitrogen.

It was first treated with 2 per cent sodium hydroxide solution, and yielded a brown alkaline extract, from which on acidifying with sulphuric acid a brown flocculent mass was precipitated. On separation of this by filtration, washing, and treating with boiling 95 per cent alcohol, a brown alcoholic solution was obtained. The precipitate formed by evaporation of the alcohol and addition of water was, after filtration, washing and drying, a brown mass easily pulverized.

Extraction of this brown powder with petroleum ether and evaporation of the solvent, left an oily, semi-solid, light-yellow mass, which was completely soluble in hot 95 per cent alcohol. On cooling, there separated a yellow, microcrystalline powder, which after separation by filtration, washing with cold alcohol, dissolving again in hot alcohol, and repeating the separation several times, was obtained free of colour and of constant melting point, and was identified as the α-hydroxystearic acid.

This acid, like the dihydroxystearic acid, is probably the product of the action of microorganisms, most likely fungi, on the organic matter of plant or animal origin.

To the cold alcoholic solution, from which α-hydroxystearic acid separated, an alcoholic solution of lead acetate was added. This gave a yellow precipitate, which was separated by filtration, washed with alcohol, suspended in alcohol and treated with hydrogen sulphide. The mass obtained after separation from the lead sulphide, and slow evaporation of the alcoholic solution, was purified by dissolving again in alcohol, and repeating the precipitation with lead acetate, and finally drying. The substance so obtained was light yellow and is identical with what is called paraffinic acid, the origin of which in the soil is very obscure. Several solid hydrocarbons of the paraffin series have been shown to occur in plants, and may therefore be a part of the organic matter added to the soil; oxidation of these might give rise to the substance found.

A peat soil containing 27 per cent of organic carbon was heated in a closed tube; this gave a dark-coloured tarry distillate which set on cooling to a semi-solid crystalline mass. This mass was first washed with cold, and then with hot alcohol, from which latter it separated, on cooling, in microcrystalline form. After repeating this solution and separation several times, the substance was treated with cold petroleum ether, and it was then found to be identical with lignoceric acid.

This acid is present in peanut oil as a glyceride, and may be a component of other vegetable oils; it might therefore occur in the soil as a residue of the decomposition of such glycerides.

There is another possible explanation of its origin in the soil.

Lignoceric acid is obtained by the distillation of wood, presumably through the decomposition of woody tissue: perhaps similar decomposition through the agency of microörganisms may take place in the soil.

S. A. SEWERIN. **The Transportability of the Phosphoric Acid of the Soil through the biochemical Activities of Bacteria.** (Die Mobilisierung der Phosphorsäure des Bodens unter dem Einfluss der Lebenstätigkeit der Bakterien). [From the Laboratory of the Bacteriological Agricultural Station attached to the Imperial Russian Society for the acclimatization of plants and animals in Moscow]. — *Centralblatt für Bakteriologie, Parasitenkunde u. Infektionskrankheiten.* Jena, 10 Dezember 1910. Bd. 28, No. 22-24, pp. 561-579. **58**

Russia

Of late years, experiments in agricultural bacteriology have supplied many and exact data respecting the transformation of the soil nitrogen by means of a series of chemico-microbiological processes which 'take place in the ground itself, and can be grouped as ammonification, nitrification, denitrification, assimilation and fixing of nitrogen.

On the contrary, the phenomena of the transformation of the phosphoric acid of the soil due to the bio-chemical activities of bacteria have been less studied, the researches being limited to the study of phosphoric acid in its passage from the soil to the plant.

It is only quite recently that the problem of the transport of the phosphoric acid of the soil has been studied more or less microbiologically.

The question was to discover whether the bacteria have some influence in transforming phosphoric acid, a slightly soluble substance, into a more soluble acid, and, if this change is due to the intervention of the bacteria, the manner of their action. The researches of Stoklasa, Koch and Kröber, Stalström, Walter, and Perotti, together with their experiments with nutritive solutions, have yielded already interesting data for the elucidation of the problem.

Recent experiments made at the Laboratory of the Imperial Agricultural Bacteriological Station of Moscow lead to the following conclusions:

1) The result of the biological process was a negative one, in so far

that it greatly diminished the amount of easily soluble phosphoric acid, and further caused the liberation of a large quantity of carbon dioxide.

2) The diminution of the above phosphoric acid is due partly to its having been directly used by the bacteria, but also to purely chemical changes which transformed easily soluble forms into insoluble.

3) Therefore, it is impossible to affirm the existence in the substratum of a direct process by which phosphoric acid, soluble with difficulty, is changed into the soluble form, or if it exists, the reverse process is more active.

4) Under the conditions which prevailed during the experiments, the production of carbon dioxide reached its maximum in the first 5 or 10 days, and a progressive diminution took place for about two months after this.

The total production of carbon dioxide in the above time was 10 to 20 times more than in sterile soils.

59 HARALD H. CHRISTENSEN and O. H. LARSEN. **Investigations into the Soil's Need of Lime** (Untersuchungen über den Kalkbedarf des Bodens. -- *Tidsskrift for Landbrugets Planteavl,* Kjöbenhavn, 1910, Bd. 17). *Biedermann's Zentralblatt für Agrikulturchemie,* Heft 1, Jan. 1911.

Denmark These investigations were undertaken conjointly with the Danish Agricultural Societies, for the purpose of establishing the quantity of lime necessary in various soils and for different crops; analyses and cultivation experiments being taken as a basis.

Soils which give less than 0.03% of $CaCO_3$ in the quantitative determination of carbonate of lime, always have an acid reaction, and do not react to hydrochloric acid: the addition of lime is necessary.

Soils which contain more than 0.15% of $CaCO_3$ are on the contrary alkaline, and react to hydrochloric acid; there is no need to add lime.

The determination of the lime by means of ammonium chloride gave very uncertain results in $^2/_3$ of the soils analysed. When the quantity of lime soluble in ammonium chloride is below 0.10%, there is, in 80 per cent of the cases, an undoubted lack of lime. When there is more than 0.2%, it is seldom that the soil has any need of lime. If these methods do not give satisfactory results, very useful indications can be obtained by biologic investigations with cultures of *Azotobacter*.

When the cultures are not successful, it means, in 80 per cent of the cases, that the soil needs lime, and in the other 20 per cent, the lack of this substance will soon be manifested; so that it may be considered that in those cases, where the cultures do not flourish, lime must be added to the soil.

Whenever the *Azotobacter* cultures develop rapidly, the addition of lime does not, except in very rare cases, in any way improve vegetation.

In the course of these investigations, it was observed that in all soils where the water did not run off well, there was need of lime, whereas in soils where the water ran off easily. and in well drained lands, its addition was useful in some cases, but not in others. In 70 per cent of the cases where the soil had never been limed previously. it was necessary to add this substance. In soils which had been treated in this manner, there was a want of lime in 25 cases out of a hundred, while there was also a deficiency in 70 per cent of the light soils and in 26 per cent of those which were averagely compact, and 19 per cent of strong clays were poor in lime.

The relation between the need of lime and the spontaneous growth of certain plants is shown by the following table:

SOILS EXAMINED.

Occurrence of lime-avoiding plants	Total Number	Without need of lime		Needing lime		Doubtful		Having no need of lime, or doubtful	
		Plants	%	Plants	%	Plants	%	Plants	%
None.	49	35	71	8	16	6	12	41	84
Limited	26	14	54	7	27	5	19	19	73
Very rare . . .	41	4	10	36	88	1	2	5	12
Rumex Acetosella .	32	2	6	29	90	1	3	3	9

A careful examination of the spontaneous vegetation allows the soil's need of lime to be determined in many cases. One should especially look for plants which do not grow well on calcareous soils. e. g. *Scleranthus annuus*, *Spergula arvensis*, *Chrysanthemum segetum*, *Viola tricolor* and *Rumex acetosella*, the latter giving an even greater security in this determination than *Scleranthus annuus*.

O. Schreiner, M. X. Sullivan and F. R. Reid. **Studies in Soil Oxidation.** — *United States Department of Agriculture. Bureau of Soils. Bulletin* No. 73, pp. 1-57. Washington, 1910. **60**

The phenomena of oxidation play an important part in the transformations of organic and inorganic matter taking place in the soil.

United States

The paper before us is an important contribution to the study of these phenomena, specially with reference to oxidation and reduction by roots as well as to oxidation in soils.

It begins with a demonstration of the reduction power of roots, made by precipitating tellurium and selenium from sodium tellurite and selenite respectively. Their oxidation power is shown by means of organic compounds, which, on oxidation, yield dyes which either colour the solution or are deposited on the root surface. These two opposite properties may occur separately or concurrently, depending upon the reaction of the medium. The oxidation within the soil itself is shown by the same reagents as those showing oxidation by the roots. The best reagent in the case of soil is *aloin*, a yellow aqueous solution of which is changed to a claret red by the oxidation. The depth of colour is measured and is taken to indicate the amount of the oxidation.

This oxidation appears to be mainly non-enzymotic, the result of interaction between inorganic constituents and certain types of organic matter.

It may also be brought about by organic matter in a state of auto oxidation and by inorganic oxygen carriers, such as manganese and iron. Both processes activate oxygen.

The oxidation in soils is increased by the addition of salts of manganese, iron, aluminium, calcium, and magnesium, especially in the presence of simple hydroxyacids, such as citric, tartaric, malic, glycolic, and their salts. The best oxidation is obtained by the addition of manganese, and the stimulating action of manganese, used as a fertilizer, is attributed to its oxidizing power: i. e., to its amelioration of soil conditions, rather than to its function as a plant nutrient. Fertilizer salts augment the oxidizing power of roots, and the fertilized soil has an increased oxidizing power after cropping.

The fertilizer salts alone sometimes increase, sometimes decrease, the oxidative functions of the soil itself, thus showing that the fertilizer salts are effecting changes directly or indirectly in the soil constituents, more particularly in the organic matter. Some types of organic matter, such as dihydroxystearic acid, isolated from certain soils, inhibit oxidation in the latter, but in the main, the oxidative power is augmented by a plentiful supply of organic matter, the nature of which in the soil is *the limiting factor* of oxidation. Excessive oxidation is in all cases harmful.

Soils oxidize substances in a manner analogous to an oxidase, and the increase noticed by the addition of certain hydroxyacids is closely parallelled by the recently discovered activating action of salts of tartaric and citric acids on the oxidative action of manganese acetate.

This analogy between the oxidative power of the soil and the action of an oxidase is especially significant, inasmuch as an oxidising enzym, the laccase of the *Medicago Sativa* (yellow lucerne), has been found to be more simple in composition than formerly supposed, and to consist of neutral salts, mainly calcium, of glycolic, mesoxalic, malic, citric and probably glyoxylic acid.

The chief conclusion reached is that everything which tends to diminish soil oxidation tends also to diminish fertility, or inversely: all the factors that favour soil oxidation promote plant growth at the same time. And as the oxidases play an important part in the proper functions of plants, so the oxidative power of the soil becomes, as it were, a symptom of soil condition.

The Nature of the Colour of Black Cotton Soil in India. — *Bull. Imperial Institute*, London 1910, Vol. VIII, No. 3. **61**

British India

The black cotton soil of India covers an area of at least 200 000 square miles and produces the greater part of the Indian cotton crop.

Investigations have been made to ascertain the cause of its black colour. The soil cracks to a remarkable degree in dry weather forming large fissures. This cracking has been attributed to the substance which imparts the black colour, and so this point has also been studied.

Some writers attribute the colour to organic matter, others to the presence of graphite or of organic salts of iron, whilst the idea has also been put forward that the colour is due to the presence of a plant which excretes a black dye from its roots.

Investigation has shown that the black colour is chiefly due to the presence of a large percentage of titaniferous magnetite and 1 to 2 per cent of soluble humus. The cracking of the soil is due to the large proportion of clay which it contains.

The soil is not rich in organic matter and appears to be much improved by the use of organic nitrogenous manures.

F. WINDIRSCH. **Obstructions in Drainage Pipes.** (Verwachsungen von Drainagen). — *Wiener Landwirtschaftliche Zeitung*, 61 J., No. 1, p. 3, Vienna, Jan. 4, 1911. **62**

Austria

In a drained field, it was found that the drains were no longer working, in consequence of the heavy rains last year. The cause of the stoppage was an obstruction of the pipes, due to an extensive formation of roots.

This phenomenon was attributed to the fact that some nitrate spread over the field in June, had been carried into the subsoil by subsequent heavy rains, thus causing an excessive development of the roots of the beets cultivated in that field.

LAIDLAW. **Irrigation in the United States.** — *Diplomatic Consular Reports*. No. 4558, 1910. London. **63**

United States

A large extent of land for which irrigation projects are under consideration was offered for sale and settlement in the various States during the year. The cost varies very much, but the Umatilla project in Oregon may be taken as an example. This undertaking is partly completed, and under its regulations each settler can only take 10 to 40 acres, the cost being 60 dol. (about 300 frs.) per acre, including water rights. The cost of development of a 10 acre lot, under the project, is given by Government officials as:

Clearing land of sage brush . .	dollars	30
Ploughing	»	22.50
Levelling	»	20
Lumber and making drops . . .	»	27.40
Locks for outlets	»	7.50
227 lbs. alfalfa seed	»	49.94
365 lbs. rye seed	»	7.50
Labour, irrigating 71 days . . .	»	177.50
100 posts	»	14
Fencing wire		52
Labour, constructing fence . . .	»	20

In all 428 dol. 34c. or L. 89 4s. 8d. = L. 8 18s. 6d. per acre.

64 R. S. SYMMONDS. **Artesian Irrigation; Alkalinity and Acidity Problems** — *Agricultural Gazette of N. S. W.* Sydney, Nov. 1910, Vol. XXI Part. II, pp. 937-946.

Australia: New South Wales

In an orange and lemon grove at Pera covering about 25 acres, and irrigated for many years with Artesian well water containing alkaline substances, especially sodium carbonate, the trees on several patches have now an unhealthy appearance. The leaves of both orange and lemon trees wither and fall. In several instances, complete defoliation of the trees has taken place, although the fruit does not appear to be injuriously affected.

Investigations have led to the conclusion that the defoliation is due to insufficient aeration and to denitrification of the soil, brought about by the action of the alkali contained in the water used for irrigation.

The carbonate of sodium neutralises the natural acidity, dissolves out the humus (organic matter) and reduces the soil to a gelatinous condition of ultimate particles, which on drying become a hard compact mass impervious to air and water.

65 HJALMAR V. FEILITZEN. **Comparative Experiments with Farm-yard Manure from Peat, Straw and Wood Sawdust Litter.** (Düngungsversuche mit Rinderdünger der mit Torfstreu, Stroh oder Sägespänen als Einstreumittel vermengt ist). — *Biedermann's Zentralblatt für Agrikulturchemie*, Heft 11, Nov. 1910. — (*Svenska moss Kulturföreningens Tidskrift*, XXIV, Jönköping, 1910, pp. 111-118).

Sweden

These experiments were made at Flahult, in Sweden, during the summer of 1909, in an experiment field belonging to the " Association for the cultivation of peaty soils." The soil chosen was sandy, recently cleared and deficient in nutritive elements. Eighteen plots of 1/2 an are each were treated with lime in the proportion of 20 quintals per hectare, 6 out of the 18 being left without any further manure.

Of the remaining 12, 9 plots were divided into three groups of 3, each of which was manured, at the rate of 50 qs. per hectare, with stable manure made from peat, straw, and wood-sawdust litters respectively. The last three plots were treated with chemical fertilizers. superphosphates, salts of potash (37 %) and nitrate of sodium, in the proportion of 3 quintals per hectare for each of these manures. The plant grown was the potato, of the *Up-to-date* variety.

In the plots treated with farm manure, the young plants sprouted on June 28th, while in those manured with chemical fertilizers or not manured at all, they did not appear until much later (July 5th), and then irregularly.

The plants began to flower on August 9th in the manured plots, those in the unmanured plots did not flower at all.

During the night of August 15th-16th, there was a sharp frost, the temperature being–2° C. The potatoes in the unmanured soil began to shoot again on August 27th, and to some extent, it was the same in the plots treated with fertilisers and with farm manures from straw and sawdust litter

On October 4th the crops were gathered, with the following results:

	Large and average tubers kg.	Small tubers kg	Tubers Total kg	% of small tubers	Starch in tubers		Quantity due to manuring		
					%	kg per ha.	Tubers	Starch in tubers	
							kg.	%	kg. per ha.
Without manure . .	1933	533	2466	21.6	14.17	349.4	—	—	—
Peat - litt. man.	11567	1767	13334	13.3	13.07	1742.8	10868	— 1.10	1393.4
Straw - » ›	6633	767	7400	10.4	12 60	932.4	4934	— 1.57	583.4
Sawdust - » ›	4033	367	4400	8.3	13.17	579.5	1934	— 1.00	230.1
Chemical fertilisers .	5933	1333	7266	18.3	12.27	891.5	4800	— 1.90	542.1

The season had been bad, and the yield was consequently much reduced, but the differences in favour of the peat left no doubt at all as to the superiority of this manure, the potatoes grown on the plot where it had been used yielding from 24 to 60 per cent more starch.

Some similar experiments made with fodder oats, sand-peas, vetch and beans, gave the following results per kg. and per ha. for the nutritive principles utilised by the plants:

	Manure	Phosphor. acid	Potash	Total nitrogen	Ammoniacal nitrogen
Peat manure . . .	49 559	106,1	325.6	239.4	105.1
Straw . .	40 690	111,1	297.0	178.6	43.9
Sawdust »	56 534	114.2	336.0	221.0	66.1

In this case also, the production obtained with the peat manure was the highest, as the following table will show:

	Green Weight kg.	Dry Weight kg.	Increase per hectare due to farm manure kg.	kg.
Chemical fertiliser only .	17 207	3283	—	—
» + peat manure . .	28 586	6563	11 376	3280
» + straw » . .	23 194	5143	5 987	1860
» + sawdust » . .	25 517	5127	8 310	1844

Or an increase of from 12 to 16 per cent.

66 **Fish Guano in Dry Powder.** — *L'Engrais*, Lille, December 1910, No. 50, p. 1389.

Great Britain

The old methods of treating fish waste are no longer considered satisfactory, the one least favoured being that of putting the fish refuse straight on to the soil. Chorley has adopted the system of converting the refuse into a dry powder, thus preserving the fertilising properties of the fish refuse intact, and eliminating 75 per cent of the total weight.

The plant consists of a concentrating chamber surrounded by double walls between which steam circulates at a pressure of 60 lbs to the square inch; in this heated chamber the fish is broken up and dried, after which it is ground to a fine powder and stored.

The amount of fish guano produced annually in England is estimated at 40 000 tons, 90 per cent of which is exported.

67 G. H. N. **Agricultural Utilisation of Sewage Water and the Hygiene of Food-stuffs.** — *Revue scientifique*. Paris, Dec. 17, 1910.

France

Messrs. Remlinger and Nouri have made experiments for the purpose of deciding the two following questions:

1) Can the pathogenic microbes incorporated in the soil by watering it with sewage water penetrate to the interior of vegetables?

2) Are the said microbes likely to be drawn to the surface of the vegetables?

The answer to the first question was in the negative, but it is quite possible that certain microorganisms get drawn on to the stems and leaves during the growth of the plant. This fact has been verified in the laboratory, but has not been observed in practice, when the soil has been properly watered. Messrs. Remlinger and Nouri have never found an Eberth bacillus or a cholera vibrio on any vegetable. The only microbes likely to be encountered are the anthrax or the tetanus bacilli, but the extreme rarity of the former in sewage waters, and the fact that the ingestion of the tetanus bacillus is quite innocuous, make the danger of using sewage waters in vegetable gardening and fodder cultivations practically non-existent.

Value of Tobacco Juice Residues as Manure. (Valore concimante dei residui dell'estrazione dei sughi di tabacco. — *Bollettino tecnico della coltivazione dei tabacchi*, Scafati. R. Istituto sperimentale, 1910. Nov.-Dec., N. 6, p. 349. **68**

An analysis made at the Chemical Laboratory of the Royal Tobacco Manufactory at Rome shows that 100 grams of the dry product contain:

Italy

Phosphoric anhydride . . .	0.74	gr.
Oxide of potassium	0.65	»
Total nitrogen.	2.96	»

After they have been pressed, the residues contain an average of 67.50 % of dry matter, and the percentage of phosphorus, potash and nitrogen is therefore:

Phosphoric anhydride . . .	0.24	gr.
Oxide of potassium	0.22	»
Total nitrogen.	0.96	»

If the average market price of the fertilising principles contained in the above matter be considered, the residue may be said to be worth about 1.71 fr. per quintal as a fertiliser.

Potash in Seaweed. — *Mark Lane Express Agricultural Journal.* December 26, 1910, No. 4135, p. 763. **69**

The advance in price of German potash salts is directing the attention of farmers to other possible supplies, although no other source can take the place of Germany. In a note on the available potash in seaweed the *Chemical Trade Journal* points out that the percentage of potash in dried seaweed is said to be about 3 per cent., so that a ton would contain about 60 lb. of potash, or more than is contained in a hundredweight of potassium cloride. For centuries, farmers living near certain coasts have taken advantage of this cheap manure, but in other parts it is wasted. Just because it is so plentiful, it is apt to be neglected. Samples differ widely, but the average may be said to be at least equal in fertilising value to farmyard manure. According to an article by Dr. Russell, in the *Journal of the Board of Agriculture*, the fertilising materials in 1 ton of fresh seaweed possessing

Great Britain

the average composition would cost from 8s. to 10s. if purchased from a dealer; but it should be noted that in a recent case in the Scottish law-courts in which a number of experts and practical farmers gave evidence, the value was estimated at 4s. 9d. per ton. Thus, there is considerable difference of opinion as to the actual money value of seaweed. Seaweed is recommended as a dressing for potatoes and especially for cabbages and roots on finger-and-toe land in the place of farmyard manure, but it decomposes more rapidly in the soil, forming soluble substances which easily wash away. In trials, it has proved fully as effective as farm yard manure for early potatoes, but it may be expected to show to greatest advantage on such gross-feeding crops as mangolds and cabbages. It is best carted on the land whilst fresh and immediately ploughed in, but it is sometimes allowed to rot in heaps, either alone, or mixed with farmyard manure. In Scotland, the fresh seaweed is applied in autumn at the rate of 25 to 30 tons per acre, and in Jersey as much as 45 tons per acre are used. It may be supplemented by artificials in the same way as farmyard manure.

70 B. SCHULZE. **Fertilising action of Ammonium Sulphate when Kitchen Salt is added.** (Die Dungewirkung des schwefelsauren Ammoniaks mit Beigabe von Kochsalz). — *Mitteil. d. D. Landw. Ges.* 1910, Stück 30, pp. 452-458; *Zentralblatt für Agrikulturchemie, Heft 11*, Leipzig, 1910, pp. 731-733.

Germany When dealing previously with this question, which has been a little neglected in modern experimental work, P. Wagner demonstrated that by the addition of ordinary kitchen salt, the efficacious action of ammonium sulphate on vegetation was made equal to that of nitrate of sodium. The results of 11 new experiments carried out in connection with this question have confirmed Wagner's previous view. The superiority of nitrate of sodium over ammonium sulphate is undoubtedly due to the action of the sodium.

The proportions of salt and ammonium sulphate used were the same as regards weight. The only case where it is not necessary to add salt to ammonium sulphate is when the soil has been treated with abundant quantities of Carnallit, Kainit and Sylvinit.

71 J. FISCHL. **Yield from Fertilising with Ammonium Sulphate.** (Felddungungsversuche mit schwefelsaurem Ammoniak auf der Freih. v. Biedermannschen Domàne Jaispitz). — *Wiener Landwirtschaftliche Zeitung*, 61 J., N. 1, pp. 2-3. Vienna, Jan. 4, 1911.

Austria Some experiments made in the open field, to determine the yield and net profit obtained by manuring with ammonium sulphate, have given the following results:

	Value of surplus crop in francs		Profit of surplus crop in francs	
	Barley	Oats	Barley	Oats
135 kg. salts of potash 40 % 100 kg. superphosphates	53.80	46.40	28.30	20.80
135 kg. salts of potash 40 % 106 kg. superphosphates 150 kg. ammonium sulphate	89.90	143.00	17.10	70.[illegible]0
270 kg. salts of potash 40 % 200 kg. superphosphates 300 kg. ammonium sulphate	121.80	192.90	23.80	47.70

	Potatoes	
	Value of surplus crop in francs	Profit of surplus crop in francs
150 kg. salts of potash 40 % 150 kg. superphosphates	35.40	3 20
150 kg. salts of potash 40 % 150 kg. superphosphates 150 kg. ammonium sulphate	292.90	213.40

The values are calculated per hectare and at the following prices: salts of potash 40 % 11.70 frs; superphosphate 9.70 frs; ammonium sulphate 31,50 frs; barley 17.80 frs; barley straw 5.20 frs; oats 15.70 frs; oat straw 5.20 frs; potatoes 5.20 per quintal.

Account must be taken of the excessive rainfall which occurred during the experiments, which was especially unfavourable to the barley.

The Preparation of a Stable Calcium Cyanamide. (Cyanid-Ges. m. b. H. Berlin; Verfahren zur Herstellung eines bestandigen Calcium-cyanamids). — *Zeitschrift für angewandte Chemie*, XXIII, J. H. 48, pp. 2279-2280, Leipzig, Dec. 2, 1910. **72**

Germany

Calcium cyanamide, industrially prepared and containing free lime, may decompose by absorbing water with a development of heat, and suffer a loss of nitrogen. The same phenomenon may also be caused by the presence of another hygroscopic substance, such as calcium chloride.

The addition of fatty matters, either animal, vegetable, or mineral, which are insoluble and fusible by heat, through absorbing the heat caused by hygroscopic absorption, would prevent any chance of decomposition at the calcium cyanamide depots and consequent gradual loss of nitrogen.

Calcium cyanamide prepared in this way and mixed with small quantities of fatty substances, when applied as manure makes no dust.

New Phosphate Beds in Mexico. *Zeitschrift für augewandte Chemie*, XXIII. J. H. 51. p. 2426. Leipzig, 23 Dez. 1910. **73**

Mex

Dr. Burckhardt, chief of the Mexican Geological Institute, has discovered extensive phosphate beds in Northern Mexico.

74 **The Pyrophosphate Giana, its Physical and Chemical Properties.** (Il pirofosfato Giana. Proprietà fisiche e chimiche). — *Stazione di risicoltura. Vercelli. Annuario 1909.* Torino, 1910, pp. 66-70.

Italy

This new fertiliser prepared by heating mineral phosphates together with sulphurous anhydride in the presence of air.

It is a white powder with the fineness of 96.20 % according to Kahl's sieve calibre No. 100. and appears, under the microscope, as an aggregate of colourless crystals with strong refractive and medium bi-refractive index, the powder appears homogeneous, and has no traces of unaltered phosphorite.

The different grains forming the aggregate are rarely more than $^1/_{500}$ mm. and the aggregate is soft. spongy and friable to the extent that a slight pressure isolates the granules.

The pyrophosphate Giana is insoluble in water, slightly alkaline, and contains up to 26.5 % phosphoric anhydride.

Prof. Alice wished to study its behaviour under the prolonged action of carbonic acid. The pyrophosphate was left 18 days in water saturated with carbon dioxide. While in the pyrophosphate not treated with carbonic acid only 3.2 % out of a total of 26.5 % of phosphoric anhydride was dissolved by a 2 % citric acid solution, Prof. Alice found that after this treatment 12.3 % of the anhydride was soluble.

A similar experiment made with phosphorites showed that in 18 days only 5 % of anhydride, out a total of 26 %, had been made soluble.

75 H. Blome. **Constitution of Thomas Slag.** — (*Metallurgie*, 1910, 7,659-667, 698-705). Abs: *Society of Chemical Industry*, 31 December 1910, Volume XXIX. N. 24. London, p. 1467.

Great Britain

The citrate-solubility of the phosphoric acid contained in Thomas slags is considerably increased by the addition of sand, slags poor in silicic acid showing comparatively little tendency to dissolve. Mr. Blome has made a number of fusion experiments with varying mixtures of tetracalcium phosphate and calcium orthosilicate, in order to determine what combination of lime, silica and phosphoric acid causes this increased solubility. Tetracalcium phosphate, 4CaO, P_2O_5, (m. pt. 1870° C.) was prepared by fusing together lime and tricalcium phosphate in the oxyhydrogen blowpipe flame. Then by employing varying mixtures of tetracalcium phosphate and calcium orthosilicate, two well defined compounds were obtained, in a series of experiments, by the quick cooling of the melt, each showing a maximum with reference to melting point and solubility in a 2 per cent. citric acid solution. The first of these maxima corresponded to the composition, $4CaO, P_2O_5 + 2CaO, SiO_2$, and the second to the composition, $4CaO, P_2O_5 + 4(2CaO, SiO_2)$. In both cases the melt was found to contain a definite amount of free lime (4.3 and 4.2 per cent.).

By slowly cooling the melt corresponding to the composition, $4CaO, P_2O_5 + 2CaO, SiO_2$, a large increase in the citrate-solubility of the phosphoric acid, silicic acid and lime may be observed; at the same time the content of free lime is considerably augmented. In both cases, then, a calcium silico-phosphate of high citrate-solubility must have crystallised out, with separation of free lime; and it is probable that, if the cooling were effected even more slowly, a melt with a citrate-solubility of 100 per cent. would be obtained. The blue monoclinic crystals sometimes found in Thomas slag have been shown by Stead and Ridsdale to consist of $4CaO, P_2O_5 + SiO_2$. A melt of this composition was found to have a melting point of 1700° C. and to show no disposition to split off lime, whilst it was totally soluble in a 2 per cent. solution of citric acid, the rate of cooling not affecting the composition.

It is probable therefore that this product, a double compound of tetracalcium phosphate and calcium orthosilicate, is the combination whose presence in the Thomas slag conditions the citrate-solubility of that material. The influence of slow cooling on the citrate-solubility, however, is only noticeable between 1800° C. and 1900° C.; below this point the melt may even be cooled quickly without detrimental influence.

Effect of different Potash Fertilisers. — *Mark Lane Express Agricultural Journal*, Dec. 26, 1910, No. 4135, p. 763. 76

Experiments have been conducted for a number of years at the Maine Experiment Station to test the relative effect of the two potash fertilisers, chloride of potassium and high-grade sulphate of potassium. The tests were made with onions, rhubarb, cauliflowers, and asparagus. All the plants received equal quantities of nitrogen and phosphate of lime.

United States: Maine

					Yield per Acre bushels	
Onions . .	Chloride	of	potassium	produced	480	lb.
	Sulphate	»	»	»	557	»
Rhubarb .	Chloride	»		»	77 400	»
	Sulphate		»	»	64 828	»
Cauliflower	Chloride	»	»		24 695	»
	Sulphate	»	»	»	30 691	»
Asparagus.	Chloride		»		4 951	»
	Sulphate	»	»	»	5 176	»

The results clearly show the different requirements of the plants, and indicate the need of considering this point when purchasing potash fertilisers.

The experiment on the hay crop is also of interest. The average yield of the no potash plots was per acre:

Hay	5 774 lb.
Aftermath	680 »

Potash plots, average of 35 plots:

Hay	6 412 lb.
Aftermath	1 555 »

The influence of the potash in the first cutting of hay was not large, but the increase of the aftermath in consequence of the development of the clover was striking.

According to the report, "the most striking result of the experiments is the comparative failure of clover on the plots to which no potash was applied, and its great inferiority on the five plots to which kainit is annually applied. On these plots, and especially on the plots to which the kainit is applied, the yield of timothy was remarkably heavy, the proportion of this grass being much greater than on plots to which the other potash salts are applied".

77 C. BRÖME. **The Value of Phonolite Powder as a Fertiliser.** (Weitere Dungungsversuche mit Phonolitmehl und Kalktrass). — *Die Ernährung der Pflanze*, Stassfurt, 1910, No. 24, pp. 235-236.

Germany

Mr. C. Bröme was of opinion that good results could be obtained by administering phonolite powder to plants, in view of the fact that potash in phonolite is in the form of a double silicate. But he afterwards discovered that Stassfurt salts of potash, in which the potash is for the most part in the form of chloride, are also transformed into silicates in the soil, while the chlorine combines with the lime to form chloride of calcium, which is soon carried away by water. Further investigations have shown that phonolite powder has no good effect, either immediately or afterwards.

Four quintals of phonolite powder per *morgen* (1) were spread over an area of 20 *morgen* in 1909, with no advantage this year in the cultivation of wheat (following a crop of beets).

78 H. METTE. **Use of Sea Salt as a Fertiliser for Beets.** — *La Sucrerie indigène et coloniale*, N. 22. Paris, Nov. 29, 1910.

France

This is the description of some trials made on an are of land, which had been abundantly manured and grown with barley the preceding year.

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(1) A *morgen* is equal to 2553 m^2, or 3053 square yards. [*Ed*].

The sea salt was spread over it to the amount of 400 kg. per hectare, and the yield of beets was 29 540 kg. per hectare in the salted plot and 27 228 in the control plot. The sugar content of the salt-fertilised beets was 21.48 per cent, that of the control beets being only 20.58.

Sea salt therefore gives better crops and a greater yield of sugar. M. Mette is of opinion that these results are not due to the direct physiological effects of this fertiliser, but to its hygroscopic action, the salt becoming saturated with the atmospheric moisture, which is then absorbed by the plant.

AD. DAMSEAUX. **Sea Salt in the Cultivation of Beetroot.** — *La Defense Agricole.* Compiègne, Dec. 10, 1910, p. 568. 79

Belgium
Austria-Hungary

Some years ago M. Damseaux reported the good results obtained in the Agricultural Garden of Gembloux by the use of a moderate quantity of sea salt in the cultivation of sugar beet. His conclusions have been confirmed by the results of some experiments made on 16 farms by the Director General of the Royal Domains of Bohemia this year.

The following is a list of the fertilisers used per hectare:

Lot I. 30 000 kg. farm manure and 300 kg. superphosphate of lime.

Lot II. The same, plus 200 kg. nitrate of sodium.

Lot III. The same as Lot II, plus 100 kg. sea salt.

Lot IV. The same as Lot I, plus 150 kg. ammonium sulphate and 100 kg, sea salt.

Lot V. Same as Lot I, plus 100 kg. nitrate of sodium and 100 kg. sea salt.

Lot VI. Same as Lot I, plus 75 kg. of ammonium sulphate and 100 kg. sea salt.

Lot VII. Same as Lot I, plus 150 kg. sea salt.

The following are the results obtained:

	Yield per hect.		Sugar content	
	Roots Kg.	Leaves Kg.	Sugar %	per hect. Kg.
Lot I.	34 100	18 000	17.2	5 990
» II.	36 100	19 800	17.1	6 170
» III.	35 200	20 200	17.2	6 050
» IV.	35 000	19 100	17.3	6 050
» V.	35 800	19 600	17.2	6 160
» VI.	35 800	20 200	17.3	6 200
» VII.	34 900	19 000	17.3	6 040

These results, like those published by M. Damseaux for 1905, show that the content of the beet in sugar is not in the least lessened by the application of a moderate quantity of sea salt.

Another result of a judicious use of sea salt is that the beet is much less liable to be attacked by two of its most dreaded enemies, the *julus* or millipedes and the gray larva of the *Agriotes segetis.*

A point of great interest, on account of the way the disease known as *burning of the roots* has spread in certain parts, is that this salt offers a successful means of controlling it, especially if used before the winter.

Modification of the Spanish Law concerning Chemical Fertilisers. (*Los Abonos minerales*). — *Imparcial*, Anno XLIV, No. 15714, 3 diciembre 1910.

A royal decree, dated Dec. 2nd 1910, amends the law of Sept. 1900 concerning chemical manures.

Spain This amendment, rendered necessary by the great progress in chemistry during the last few years, deals with instructions about the naming of fertilisers; with the legislation of trade marks; with control analyses to establish the content of nitrogen, phosphoric acid, and potash, and finally mentions the laboratories authorized to make the above analyses.

81 ALB. B. **Electroculture.** — *Revue Scientifique.* Paris, 10 Déc. 1910.

The remarkable influence of electricity on the development of plants is demonstrated by the experiments of Bertholon and Spechnew, who obtained by erecting conductors in different parts of the field an increase of 55 % in wheat, barley and oats; and by those of M. Paulin, who by means of a central, isolated metallic rod, from which conductors radiated into the soil, gathered potatoes 21 days earlier and with a 50 % increase. Finally, since 1903 M. Basty has made experiments with simple lightning conductors sunk in the earth.

The results obtained by M. Basty seem to be conclusive:

Germination is more rapid, crops ripen earlier and the yield is heavier.

The results obtained by different experimenters lead to the conclusion that atmospheric electricity may prove useful in agriculture and it is hoped that experiments in electro-culture will be carried out on a large scale (1).

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(1) For recent large scale electro-cultural experiments at Bitton, near Bristol, and for experiments in hot houses, see: J. H. PRIESTLEY. Electro-Culture: Overhead Electrical Discharges and Plant Growth. — *Journal Board of Agriculture*, April, 1910, p. 16.

For older experiments in electro-culture, begun in 1894 and continued without interruption for several years, at Suessola near Naples in S. Italy, on the action of atmospheric electricity on the growth of wheat and maize, see: ITALO GIGLIOLI, *Campo Sperimentale di Suessola Cultura del Frumento, 1899-1900, XIII Anno di cultura continua del Frumento e del Granturco. Cultura Elettrica.* Portici, 1901. The results obtained at Suessola were generally favourable to electric action. [*Ed.*].

E. J. Russell. **Agriculture in the Dry Regions of the British Empire.** — *Nature*, Nov. 24, 1910, p. 111. **82**

British Empire

The ordinary farm crops, on which the supply of food-stuffs depends, seem to be produced best in regions where the rainfall varies between 20 and 35 inches per annum. Where the upper limit is exceeded in the British Islands, a good deal of pasture is found; on the other hand, it is notable that the great wheat-producing districts. the Eastern Counties, are regions where the rainfall comes nearer to the lower limit. Special agricultural methods become necessary where there are less than 20 inches of rain, as is the case over large areas in Canada, Australia, India and South Africa. These methods fall into two groups: irrigation is required if there are less than 10 inches of rain, while special cultural operations, collectively known as "dry-farming," are used when there are as much as 15 or more inches. Between 10 to 15 inches sometimes the one and sometimes the other method proves the more economical.

"Dry-farming," methods are of great interest to the student of soil physics. Their object is to keep the rain water near the surface of the soil and to prevent loss by evaporation, by surface drainage, and, if possible, by percolation. A remarkable degree of success appears to be attained. An examination of the methods in vogue in different parts of the world shows that all have certain features in common. The land is ploughed up in a rough state and the subsoil compacted directly after harvest, or before the rainy season, if there is one; in countries where the rain is unevenly distributed and torrential downpours occur, rather elaborate terracing is arranged to prevent any loss by running off the surface; any streams that form having to follow a sinuous course over the whole field, so that absorption may be as complete as possible. Directly the rain is over, the surface soil is thoroughly stirred, thereby losing a little water by evaporation, but forming a loose layer. The water is thus imprisoned between the compacted subsoil and the thin loose layer of surface soil. The greatest importance is everywhere attached to the maintenance of this loose layer on the top; cultivation is repeated as often as rain has fallen, or whenever for any other reason it is considered the layer has become compact. Incidentally this repeated cultivation has the effect of keeping down weeds, which, if unchecked, would use up a good deal of the water.

In the dry parts of Canada and the United States, where these methods are most highly developed, it is customary to take a crop—usually wheat—once in two years only, leaving the land fallow in the alternate years. It is considered that two-thirds or even more of the year's rainfall may, under favourable conditions, be stored in the soil for the next year; thus, if only 15 inches fell each year, making a total of 30 inches in the two years, the wheat crop grown during the second year should have moisture available equivalent to 25 inches or more, on which, of course, it should do very well. Unfortunately, the rainfall does not necessarily remain near its average, but fluctuates considerably, and records are not available for many districts; it has occurred in districts where dry farming was considered a great success, that the rainfall was, after all, about 20 inches, and ordinary cultivation would have been equally good.

However, the interesting problem in this: What is the function of the compact subsoil and the loose surface layer? It is usual to suppose that the compactness of the subsoil facilitates the upward lift by surface tension of water from the permanent water table, but it would seem equally rational to suppose that the compact subsoil retards the percolation of the water. So far as the writer is aware, no crucial experiments have been made that show beyond doubt how far the upward movement of water by surface tension is a factor in ministering to the needs of the plant. That it takes place, of course, is not disputed, but its relative importance is unknown. The function of the loose top layer, the "mulch," is not settled. It is commonly regarded as a break in the structure of the soil leading to a rupture of the "capillary films" of water. It may equally be a non-conducting layer shielding the mass of the soil from the sun's heat, and therefore lessening evaporation.

Until these problems are solved, little advance can be expected from the scientific point of view, although the practical man continues to effect improvements. The fundamental need seems to be a mathematical analysis, showing how water will distribute itself over a mass of particles varying in diameter from below 0.002 mm. up to 0.1 mm., the bulk being below 0.01 mm., and how rapidly any disturbance in equilibrium will readjust itself.

The pressing need of work in this direction may be gauged from a perusal of the Transvaal, the Cape, or the S. Australian Agricultural Journals; in South Africa alone a considerable part of Cape Colony, the western halves of the Orange Free State and the Transvaal, the whole of the Bechuanaland Protectorate and a considerable portion of southern Rhodesia fall within the "dry lands" area. Some useful practical work may be expected from the newly established dry-land experiment station, but that will only intensify the necessity for a scientific study of the problem.

There is also need of work by the plant physiologist on the effect of insufficient water supply on plant growth. In Dr. Leather's paper, data are given showing how much water is transpired by a plant in the production of one pound of dry matter, and on the basis of these figures a table is made out showing how much irrigation or rain water is needed to obtain crops of certain sizes. The values depend on the amount of food-stuff available; less water is needed per pound of dry matter produced in a rich soil than in a poor one.

Although there is no direct causal relationship between transpiration and assimilation, the ratios obtained by different observers in various parts of the world are roughly of the same order; thus for barley the number of pounds of water transpired per pound of dry matter produced are:

Lawes and Gilbert (Rothamsted, England, 1850).	lbs. 257	= kg. 116.221
Wollny, Germany	» 774	= » 340.622
King (Wisconsin, U. S. 1894).	» 393	= » 178.029
Leather (Pusa, India 1910) on manured soil. .	» 480	= » 217.440
(Pusa, India) on unmanured soil . . .	» 680	= » 308.040

83

W. W. Burr. **Storing Moisture in the Soil.** — *The Dry Farming Congress Bulletin.* Spokane, Wash., Nov. 1, 1910, Vol. III, N. 21, p. 427.

United States: Nebraska

1) Land which is under thorough cultivation absorbs water much more freely than land not under cultivation, or which is covered with grass, or for any reason has a hard surface.

2) Land under thorough cultivation loses but little water from below the first foot by surface evaporation, so long as the mulch is kept in good condition.

3) A growing crop uses water from the land in proportion to the growth of dry matter in the crop.

4) Land under summer tillage or thorough cultivation from May 1 to September 1 on the Nebraska substation farm, has accumulated from 5.5 to 7 inches more water in the first six feet of soil, than similar land growing a crop. The water so stored has been equal to from 4 to 50 per cent of the rainfall for the same period. The moisture content on summer-tilled land increases below the six-toot area and is apparent to a depth of at least 10 feet.

5) Water stored in the subsoil to a depth of at least six feet is available for the use of farm crops, and alfalfa is able to draw water from much deeper areas.

6) Abundance of water in the subsoil is a great protection to the crop against drought, and moisture in the surface soil, while it may favor the immediate growth of the plant, does not protect it against drought. The protection is in almost exact proportion to the total available soil water within the reach of the crop.

7) Grass crops (alfalfa and brome grass) dry the subsoil to such an extent, that the first crop following grass is wholly dependent on the season's rainfall for its moisture supply.

8) A rainfall of from a quarter to a half inch may have a decidedly beneficial effect upon a growing crop, and is of great assistance in securing

a good stand at seeding time. Such a rainfall has little, or no effect in increasing the water in the lower soil, unless the surface is already moist from previous rains. Less than half an inch of rain falling on dry soil mulch does not wet the soil below the mulch, and is soon evaporated by the sun and wind.

84

A. M. Ten Eyck. **A System of Soil Culture. Three Steps.** — *The Dry Farming Congress Bulletin.* Spokane, Wash., November 1st, 1910, vol. III, No. 21, p. 429-430.

United States: Kansas

So far as cultivation is concerned, there are three principal steps in the conservation of soil moisture:

1) The soil must be loosened to a considerable depth in order to prepare a reservoir to receive the rain and to carry the water downward into the soil. This is accomplished by deep ploughing or by disking unploughed lands.

2) The water which is carried downward into the subsoil must be brought back again into the surface soil where the seed is germinating and roots are growing, and to accomplish this, a good connection must be made between the furrow-slice and the subsoil, and this is the purpose in the use of the subsurface packer.

3) Finally, in order that the water which is drawn up toward the surface by capillary action may not reach the air and be wasted by evaporation, the upper two to four inches of soil must be kept mellow, in the form of a soil mulch, which is accomplished by frequent cultivation, and this is applicable not only to corn and other intertilled crops, but also to wheat and other small-grain crops.

A New Method. — A new method for preparing the seed-bed for wheat is now coming into general practice in Western Kansas. The plan is to list the ground with the ordinary corn lister as soon after harvest as possible. The lister furrows are run about three to three and a half feet apart, very much the same as when the lister is used for planting corn. Later, when the weeds have started, the soil is worked back into the lister furrows by means of a disc harrow or disc sled or disc cultivator.

The disc sled has just recently come into use and is considered a preferable implement to the disc harrow. This sled is constructed with extra large discs, especially for this purpose, but the sled may also be used for cultivating corn. The sleds are made to cultivate either one or two rows.

Several cultivations by the disc harrow are usually required in order to bring the field into good seed-bed condition. Once over with the disc sled is usually considered sufficient, the further work necessary to prepare the seed-bed being given with the common harrow or other cultivating implement.

In a dry climate this method of preparing the seed bed has these advantages: The cultivation of the land soon after harvest tends to conserve the moisture already stored in the soil. The furrowed land is in good condition to catch and store the rain and the later cultivation clears the land of weed, and leaves a mellow soil mulch to conserve the moisture which has been stored in the subsoil. The early and continued cultivation of the soil favours the action of the bacteria and the development of available plant food.

By practising this method of farming the farmer may cultivate a larger area early in the season when the soil is in good condition to cultivate, whereas if it had been necessary to plough the whole area, some of the land might have become too dry to plough well. Likewise the later ploughing leaves the soil too loose and not in good seed-bed condition.

By several cultivations with the common harrow, after the ridges have been worked down with the disc sled, the soil may be well pulverized and firmed and put into good seed-bed condition. In fact, as will be observed, the larger part of the seed-bed area has not been loosened deeply, and even with little or no rain to firm the seed-bed, the sub-surface soil remains firm and the seed-bed is in ideal condition to start the wheat.

LAIDLAW. **Dry Farming in the States of Montana, Oregon and Washington.** (Dry Farming). — *Diplomatic and Consular Reports*, No. 4558, London, 1910. **85**

United States: Montana Oregon Washington

The United States 320 acre Homestead Law, passed in the year 1908, is applicable to the States of Montana, Oregon and Washington. The Secretary of the Interior has designated as open to entry under this Act 45 664 640 acres in Montana, 8 304 160 acres in Oregon, and 4 076 900 acres in Washington. A large portion of this designated land will never be suitable for anything but grazing, but some of it, under dry-farming methods, will become valuable wheat land. During the year, a farmer near Helena, (Montana) sowed 160 acres of this dry land with oats, and reaped a crop of 36 bushels per acre, weighing 46 lbs. to the bushel.

From 26 acres sowed to hard spring wheat, he reaped 27 bushels per acre, weighing 60 lbs. per bushel; 82 acres of rye threshed 18 bushels, and 7 acres of barley 46 bushels per acre.

V. T. COOKE. **Dry Farming in Wyoming. Failures due, as a Rule, to Haphazard Methods.** — *The Dry Farming Congress Bulletin.* Spokane, Washington, Nov. 15, 1910, Vol. III, No. 22, p. 435. **86**

United States: Wyoming

Thousand of acres of arid land in the South-Eastern part of Wyoming have been reclaimed by the adoption of scientific methods of dry farming.

When Mr Cooke first went there a few years ago, that part of the State was nothing but a barren waste, without a house or home for many miles. During very recent years the people have taken up dry farming, and that stretch is now transformed into a fine farming district and has been rapidly settled.

Though there have been failures there as well as in other parts of the country, these have been due mostly to the adoption of haphazard methods in planting and cultivation, but despite the fact that this was the driest season in 30 years for the state of Wyoming, those who have followed scientific principles have met with success in their crops.

The fact is that the most successful dry farming cannot be brought about by following hard and fast rules set down by scientific men, for no rules can be made to meet all conditions. To meet with the greatest success the farmer must study the local conditions and make a systematic study of his farm, for different conditions are bound to exist in different localities.

87 Dry Farming in Oklahoma. Raising Maize and Kaffir Corn without Rain. —

Monthly Press Bull. Oklahoma State Board of Agric., Ser. of 1910. Guthrie, Nov. 1910, No. 9, pp. 4-5.

United States: Oklahoma

The past season has been a good one to practice dry farming methods. The severe summer has taught the farmers in the South-Western portion of Oklahoma that it pays to keep cultivating the growing crops. The farmers who followed this plan were successful in raising Milo maize and Kaffir corn without rain (1).

S. A. Webster, who lives Northeast of Altus, raised a good crop of Milo maize without a drop of rain. The heads were large and heavy and grains were well developed and full. The crop made thirty-five bushels to the acre (30.4 hectolitres per hectare) while neighbouring farmers, who laughed at him about drying out his land by continuous cultivation, made a failure of their crop. Mr. Webster plowed his ground deep and followed with a combined lister and planter. He was in the field every ten or twelve days with a cultivator until the crop matured. By avoiding planting of Milo maize and Kaffir corn too thick, and by continuous cultivation, the farmers in that section should have no trouble in raising enough feed for their winter's use even in a dry season like the past one. The Western Oklahoma farmers who heeded the advice given by State experts, to plant Kaffir corn to insure plenty of feed for the winter, have been convinced that no farmer in Western Oklahoma can afford to be without ten to twenty acres of Kaffir corn or Milo maize on his farm. Even though a severe season will make corn a complete failure. the farmers in this section of the State, by planting a few acres of these drouth-resisting crops, will have plenty of feed for all kinds of farm animals. Dwarf Milo maize as a substitute for corn is probably the best. It will make grain when all the other of the sorghum family fail for lack of moisture. It usually yields twenty-five to forty-five bushels per acre.

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(1) Kaffir corn and Milo maize, or African Millet, are two varieties of *Sorghum vulgare* (*Andropogon Sorghum*). BAILEY, *Cyclopedia of American Horticulture*, p. 1690, vol. IV. [*Ed.*]

The grain is equal to corn in feeding value, and all kinds of stock eat it readily.

Milo maize and Kaffir corn are strictly dry weather crops. They do not make much grain if there is rain at time of heading. To secure the best results the crop should be in two or three plantings, made about ten days or two weeks apart. One of these plantings is sure to head during a dry spell and make a good crop of grain.

L. Hiltner. **On the importance of Obtaining Pure Seed.** (Ueber die Bedeutung und die Bestimmung der Reinheit des Saatgutes). — *Praktische Blatter Pflanzenbau und Pflanzenschutz*, VIII Jahrgang, Heft 12. Stuttgart, Dez. 1910, pp. 137-152. 88

Mr. Hiltner draws attention to the great difficulties encountered in obtaining pure seed, and urges the necessity of adopting, by international agreement, a uniform principle for the purpose of regulating the question. **Germany**

The following is a brief abstract of the proposals made:

1) In selecting grass seeds, only those should be rejected which are certainly sterile, this in order to eliminate, as far as possible, sources of error arising from differences of individual judgment.

2) As foreign elements should be considered, for all kinds of seed:

a) the seed or chaff of other corn or grass, earth, sand, gravel etc.;

b) the débris of stalks, leaves, etc. belonging to the same plant.

All sterile grass seeds, and all stunted, broken, or spoilt seeds should be grouped together under the name of *Mangelkörner* (defective seeds).

3) The weight percentage of defective seeds should be calculated directly; and the germinability of the healthy seeds which remain gives the net coefficient of germinability.

4) Two separate guarantees should always be required; one for the degree of purity, the other for the degree of germinability, the latter being based on the gross germinability.

5) The limits of purity at present adopted ought only to be considered correct if the defective seeds are not included.

6) A high degree of germinability may compensate for a want of purity, always provided the latter is not due to the seeds of noxious plants.

89 G. d'Ippolito. **The Action of certain Anticryptogamic Substances on the germinative Energy of some Varieties of Wheat and Oats.** (Azione di alcune sostanze anticrittogamiche sulla energia germinativa di alcune varietà di frumento e di avena). — *Le Stazioni sperimentali agrarie italiane.* Modena, 1910, fasc. X, pp. 735-754.

Italy

Mr. d'Ippolito's object was the investigation of the different varieties of cereals which may be supposed to possess a different resistance in the constitution of the tegumentary and embryonic tissues, causing them to act differently under the same anticryptogamic treatment applied in absolutely identical conditions.

The experiments were made with 20 varieties of wheat and oats, and the examination was limited to the study of the action of copper sulphate and lime, the compounds most usually employed against the cryptogamic diseases of cereals.

The experiments were made in china germinating pots, and 200 seeds were used for each experiment; the seeds were covered with filter paper and kept at a temperature of 24-25° C. for 8 hours out of the 24, and 18° for the remainder of the time.

The results of the experiments, as shown in a number of tables, was as follows:

1) The treatment by copper sulphate at 0.5 °/₀ for two hours, more or less lowered the degree of germinability and the germinative energy in the following varieties of wheat: *Noe*, *Rieti*, *Cologna Veneta*, *Gentile rosso*, *Quattrocoste*, *Marzuolo Veronese*, *Varesotto*, *Duro di Puglia*, *Bianco*, *Scorzanera*, *Maiorica*, *Schreff* and *Dattel*, as well as the varieties of oats *Ligowo*, *Scotch*, *Black Hungarian*, *Russian* and *Géante à grappes*.

The two varieties of wheat *Triminia* and *Bordeaux*, on the contrary, far from being injured. seemed to be improved by this treatment.

2) The treatment by copper sulphate at 0.25 °/₀ for one hour, had practically not the slightest effect on the degree of germinability of all the above-mentioned varieties, and the germinative energy also remained intact.

3) Milk of lime at 5 °/₀ did not affect the degree of germinability or the germinative energy at any appreciable rate, and it was favourable in all respects to all the varieties, with the exception of the *Black Hungarian* and *Russian* oats.

The writer gives some rules on the practical treatment of cereals by anticryptogamic preparations.

90 Augusto Tamburini. **Practical Method for verifying the Deterioration of Maize Grains in connection with Pellagra.** (Ricerche per trovare un metodo facile e pratico per porre in rilievo l'avaria del granturco). — *Boll. del Ministero d'Agricoltura.* Roma, Anno 9, Ser. C, fasc. 7, pp. 1-4.

Italy

This reaction is based exclusively on the fact that deteriorated maize when finely ground and moistened with methylene blue rapidly discolours in the lower half of the mass. The extent of the alteration in the maize under examination may be very closely estimated from this rapidity.

This report, after briefly touching on all the recent ideas as to the transmission of pellagra by a *filaria* or by *simulida* (1) suggests the necessity of making more extensive scientific investigations on this subject: laboratory experiments, as a matter of fact, would furnish sufficient data for deciding whether the present organisation of the campaign against pellagra should not be greatly transformed.

Field-crops. — Industrial Crops. — Horticulture. — Arboriculture.

Cereals and Pulse in the Yunnan. — *La Quinzaine Coloniale.* Paris, Novembre 25, 1910. **91**

China: Yunnan

The population of the Yunnan are making every effort to find other crops to cultivate in place of the opium poppy, whic, has been prohibited by the Government. They have sown large tracts of land with cereals and pulse of various kinds, especially wheat and soy-beans. Unfortunately, however, the cultivation of these crops will be useless to the farmers as a substitute for opium, unless they can export them, and there are Imperial Edicts in force which prohibit the exportation of wheat and other cereals. On this account, the farmers have been in the habit of cultivating only just the amount of these products that they require for themselves and their families.

Lower Price of Bald Wheats in Comparison with Bearded Wheats. — *Il Coltivatore.* Casal Monferrato, Anno 56, N. 34, Dec. 10, 1910, p. 503. **92**

Italy

In Italy, bald varieties of wheat are sold at from half a franc to one franc less per metric quintal than bearded wheats, because generally believed to be of inferior « strength », i. e. to contain less gluten and therefore to be less suited to make good maccaroni and bread.

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(1) Dipterous insects: *Similium* sp. (*Simulida*). [*Ed.*]

Prof. M. Oliva has tested this opinion by analyses made in the Laboratory of the Milan Agricultural Station of both kinds of wheat produced under the same conditions. The percentages were as follows:

		Wet Gluten	Starch
Bearded wheats:	Rieti	38.85	66.60
»	Cologna	43.50	64.70
Bald wheats	Noé	40.50	67.36
» »	Gentil rosso . .	38.80	66.65

It is evident that the difference is not such as to justify the prejudice against the bald varieties, especially as they produce from 400 to 500 kg. per hectare more than the bearded varieties, if grown under suitable conditions.

93 LIMAN P. WOOD. **Dry Farmed Grain from a Miller's Standpoint.** — *The Dry Farming Congress Bulletin*, Spokane, Wash., Nov. 1st, 1910, vol. III, No. 11, p. 426.

GLUTEN CONTENT OF THE WHEAT.

United States

In the case of dry farmed wheat, the crop has a larger amount of food at its disposal and in a more concentrated form, and as a result, a grain is grown richer in the more valuable nutriments, such as gluten or protein. In short, nature puts into the dry farmed wheat practically the same amount of valuable building material that she does in the "wet farmed" wheat, but as the water causes a greater number of pounds to be produced of the "wet farmed" wheat, it follows that the essential building materials are in a more concentrated form in the dry farmed wheat, hence the result, stronger and more glutinous wheat. After a certain point is reached, additional water causes a starchy development or a diluting of the gluten with the starch. Starch growth may also be produced by other causes, such as inherited characteristics.

In the past year, the writer examined a great many hundreds of samples of both irrigated and dry farmed wheat, and had several hundred samples tested by the wheat and flour inspector, T. W. Gannon.

In reply to an inquiry, Mr. Gannon wrote as follows:

"I am very much impressed with what I have tested, and find dry farmed wheat very much superior to irrigated wheat from a flour quality standpoint; it has a much better quality of gluten and will produce a higher quantity and quality of bread than the other."

The record of the samples tested by Mr. Gannon shows that the dry farmed wheat runs more uniform in quality and quantity of gluten than the irrigated wheat. The dry farmed wheat runs from 35 to 47 per cent of good quality of gluten, with the exception of one sample. Some of the irrigated wheat runs up to 44 per cent, and in others it was very poor. All in all, every sample of dry farmed wheat that was tested was fit for use, but several samples of irrigated wheat had to be rejected. The samples were not selected but were taken as found in the market.

L. A. FITZ. **Effects of a Prolonged Exposure of the Wheat Crop to the Open Air.** (Handling Wheat from Field to Mill). — *U. S. Dpt. of Agriculture, Bureau of Plant Industry*, Circ. No. 68, pp. 1-12. Washington, 1910. **94**

Mr. Fitz states that 44.3 per cent of the area cultivated in winter wheat in the United States, and 94.7 per cent of the spring wheat area, are in the region of the Great Plains. Most of the wheat grown here is kept in the open for a long time, stacked in sheaves, before being threshed. This long exposure discolours the wheat, increases its moisture content, decreases the unit weight per bushel, and if very long, causes the grain to germinate in the sheaf.

United States

When wheat is put in heaps after the harvest, an exudation takes place probably due to biological action, and where it occurs normally, the colour, appearance and weight of the wheat are improved. This exudation process has a favourable action on the milling properties of the wheat and on the value of flour for panification; the threshing is also easier.

The extra cost of piling the wheat in heaps is more than repaid by its increased value and price.

Brit. Consul MILLER. **Barley Production for Brewing in Algeria.** — *The Board of Trade Journal.* London, 1st Dec. 1910. **95**

The year 1909 was one of plentiful harvest in Algeria and barley exports showed an advance, compared with those of 1908, of over 40 000 tons. Almost all of the grain exported from Philippeville is shipped to the North of France, and is bought largely by brewers. Efforts have been made to interest British brewers in Algerian barley, but these have not resulted in increased shipments to the United Kingdom owing to the presence of impurities (sand, stones, dirt, etc.) in the barley.

Algeria

The Governor General of Algeria has promulgated an order threatening with legal procedure and punishment for fraud any shipper in whose merchandise more than 4 per cent of foreign substances is found. It is hoped that this order will remedy the existing state of affairs in this respect.

The barley from this province has one great fault in the eyes of British brewers, compared with the barley of Smyrna and Benghazi. Here the grain is very irregular in size, that of Smyrna is quite the opposite and has in addition a better colour. To a British buyer who has a barley-cleaning machine, Algerian barley presents attractions which render it superior to that of Smyrna, but, without such a cleaning and grading machine, Algerian barley cannot be treated at its best in the United Kingdom. It should be remembered. however, that all the North of France brewers buy, not in Smyrna, but in Algeria.

96 C. P. Hartley. **Method of Sowing Maize.** (Metodo conveniente de sembrar el Maiz) — *La Hacienda*, Buffalo, N. Y., U. S., 1910. Nov. and Dec., Vol. I. Nos. 2 and 3, pp. 61-62, 73-74.

United States

It is the custom in the United States to use a seed drill which sows the seeds in one line or two. The seeds are dropped in small heaps, so that the plants growing from them are very close together and develop badly, both above and below ground.

The question has now arisen as to whether it would not be well to sow the seeds separately; and in order to settle the problem, some trials have been made in different kinds of soil, with the use of different varieties of maize. These experiments have shown that the best results are obtained by sowing the seeds at a certain distance apart. The seeds were put in the ground at a distance of 5 inches, on lines 40 inches apart, and the result, in comparison with the crops from seeds sown in heaps, was an increase of production of between $3^{3}/_{4}$ and 5 per cent.

Several figures in the text show the development of the maize plants and their roots which were grown close together, in comparison with those allowed a free growth.

97 G. Alice. **Work done at the Vercelli (Piedmont, Italy) Experimental Station for Rice Cultivation, in 1909.** (Attività della Stazione Sperimentale di risicoltura di Vercelli. nel 1909). — *Stazione Sperimentale di Agricoltura, Vercelli, Annuario, 1909.* Turin, Dec. 1910.

Italy: Piedmont

Experiments with potash fertilisers in rice fields. Quantities of less than 2 metric quintals per hectare of sulphate of potassium (added to superphosphates and organic nitrogenous manures) had practically no effect, while, by using 2 quintals, an increase of about 20 frs. in the value of the crop per hectare was obtained. The simultaneous use of ground horn and ammonium sulphate gave better results than the separate use of these two substances.

As the various nitrogenous fertilisers that were used (horn, ammonium sulphate and calcium cyanamide) have practically the same manurial value for rice-fields, the price of each kind may therefore be the deciding factor in their adoption.

A new phosphate fertiliser has been tried; it is prepared by treating Giana pyrophosphate with a small quantity of sulphuric acid. A detailed, physical, microchemical and chemical study of it is given, with special reference to the solubility of this fertiliser in water charged with carbon dioxide and in the soil solution. It has been used to manure extensive rice fields with good results.

Controlling weeds. A method that has been found very successful consisted in sowing the rice at a depth of 4 or 5 cm. in a non-watered soil, and leaving it to germinate by the natural moisture of the soil only.

Rice germination. The results are given, and illustrated with photographs, of some experiments made by Prof. Giovanni Alice, Director of the Station, for the purpose of finding out whether the germination of rice is delayed by the fact that the fields have not been flooded. Experiments have shown that rice grows very well during the first period with no greater degree of moisture than that necessary for all cereals. There is no doubt, however, that rice grows more rapidly and vigorously when sown in soils that have not been flooded but are very damp.

KRAUSS. **Varieties of Japanese Rice introduced into Hawaii.** — *The Tropical Agriculturist.* (Hawaiian Forester). Dec. 1910. Colombo. p. 504. **98**

Japan. Hawaii

One of the main objects of the investigation of the Hawaiian Commission in Japan was to study local varieties of rice at first hand, and to secure, if possible, varieties better suited to Hawaiian conditions from cultural stand points. After travelling through the principal rice-growing sections and consulting rice specialists, the following four varieties were determined upon as most likely to meet Hawaiian requirements:

No. 1. Considered the best variety grown in Japan. Fairly early and a fair yielder: 100 clumps gave an average of sixteen fruiting culms per clump.

No. 2. A most promising new variety, considered of finest culinary quality.

No. 3. The standard variety of Japan and the rice principally exported to Hawaii.

No. 4. Another standard variety considered one of the most promising.

With the assistance of the Kyushu and Yamaguchi Stations, 100 pounds of select seed of each of these varieties was purchased for general distribution among Hawaiian planters. The seed should arrive in ample time for spring sowing.

Rice-Growing in British Guiana. — *The Tropical Agriculturist.* Colombo, Dec. 1910, p. 561. **99**

British Guiana

British Guiana, a few years ago, was a conspicuous example of a colony with only one important agricultural industry; there were no exports besides sugar, except a small amount of cacao. To-day, sugar easily maintains its old position, but British Guiana is at present the greatest rice-producing country in South America. Peru produces nearly as much, and Argentina also has an extensive production, but in British Guiana rice cultivation is making great strides, and there is every prospect that an important industry will be permanently established, and that within the next few years the colony may attain much greater importance as a source of rice both for itself and for the neighbouring countries, especially if present experiments in cultivating and harvesting the crops by machinery should prove successful. The quality of British Guiana rice is very high.

The choicest quality, *Berbice Creole*, appears to be excelled only by *Carolina Golden Grain*, and if care is taken to maintain the standard and to meet the requirements of the market, in the mode of preparation, British Guiana rice may win a place for itself in the markets of Europe (1).

100 **Increased Areas under Rice in Brazil.** — *Tropical Life*. London, Dec. 27, 1910. Vol. VI, No. 12, p. 230.

Brazil

The Brazilian Government has founded an Experimental Station for rice on the Central Railway at Moreira Cezar and has engaged an expert from Louisiana to develop the use of irrigation in rice fields. In the south of the State of Sao Paulo the rice grown in the Iguape district is said to equal the Rangoon rice. In Santa Catharina it is grown between the Serra Geral and the sea, but suffers from lack of proper irrigation. In the States of Rio de Janeiro, Espirito Santo and Minas Geraes the Red Pachola variety, or mountain rice, is grown on a large scale, and the exports from the State of Rio de Janeiro to other parts of Brazil have almost trebled since 1906. From Minas, where, up to 1904, the average export to other parts of Brazil was about 500 000 kg., the exports in 1907 rose to over 8 000 000 kg. With a duty of 160 reis per kg. on imported rice, the foreign product is being gradually driven from the market and Brazilian-grown rice will soon be sufficient for home consumption.

101 **Rotation Cultivation of Rice and Jute and its Influence on the Rice Harvest of Bengal, British India.** — *L'Agriculture pratique des pays chauds*. N. 92, pp. 415-420. Paris, Nov. 1910.

British India

The Bengal Department of Agriculture published a report in 1907-1909 on the cultivation of jute in rotation with rice in the same year, and stated

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(1) In 1908-09 the exportation of agricultural produce from British Guiana was valued as follows:

	Pounds Sterling
Sugar	1 257 828
Rice	50 064
Molasses	7 891
Molascuit	23 193
Rum	185 852
Balata	98 128
Timber and Woods	22 178
Charcoal	8 164

The Statesman's Yearbook, 1910, p. 259. [*Ed.*]

that experiments had shown that this could be safely done. The present reports show that the position of jute in relation to rice, in the four kinds of land where the rotation has been tried, is very different from what it was thought to be.

These four kinds of land comprised:

1) high soils that do not retain the rain;
2) low soils retaining a small percentage of water;
3) low soils submerged for 6 months in the year;
4) soils submerged during the rains and benefiting by silt deposits.

It appears from a report made by Mr. Basu, Assistant-Director of Agriculture in Assam and Bengal, that jute is a serious competitor to *aus* rice (early autumn rice) in all the kinds of soil where it is cultivated. The cultivation of jute is more profitable than that of *aus* rice, because in spite of the high price of the latter during the last few years, 2 $^1/_2$ million acres (1 010 000 hectares) have been given up to the cultivation of jute.

When grown in rotation with *aman* rice (winter rice), the jute causes a decrease in the yield of the cereal by exhausting the soil, and the same thing happens when the two are grown together.

Among the reasons against this double cultivation in jute fields, the unfavourable conditions for sowing and transplanting the rice must be considered, as well as the impoverishment of the soil, and the care which the operations of retting and whitening the jute fibres require.

A large area of the province of Bengal would be uncultivated, but for jute (1).

Intensive Potato Culture in Ireland. — *Fruit, Flower and Vegetable Trades' Journal.* London, Dec. 31. 1910. 102

Great Britain and Ireland

In the official report upon the early potato crops in Ireland this year reference was made to a second crop which had been planted at one of the principal centres.

The practice of growing two crops of potatoes on the same land in the same year is uncommon, and in most districts would be impracticable. Such a procedure indeed, would be considered by the average farmer as out of the question, both on account of the shortness of the growing season, and the inability of the land to raise two healthy and productive crops within a period of seven or eight months. The method has passed the experimental stage, and a few enterprising growers in Ireland have succeeded in obtaining from the same land profitable crops of early and late varieties in one season. This is intensive culture in the highest sense of the term, and, moreover, is a form of the modern hustling in crop production, which probably owes its origin to Irish enterprise.

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(1) In 1907-08, the total area under jute in British India was reckoned as 3 942 675 acres. The total area under rice in all British India was 75 980 682 acres, of which 24 488 800 in Bengal, and 12 447 500 in Eastern Bengal. *The Statesman's Yearbook*, 1910, p. 134. [*Ed.*].

103 L. WITTMACK. **Study of the Stock Plant of the Potato.** (Studien uber die Stammpflanze der Kartoffel. — (*Ber. deutsch. bot. Ges.*, XXVII, l. Generalversammlungsh, pp. 28-42, 1909). *Botanisches Centralblatt*, Bd. 116. No. 2, pp. 35-36. Jena. 1911.

Germany

Professor Wittmack divides the known species of *Solanum* into four groups, according to the form of the calix and the corolla, and traces their geographical distribution.

Out of about 900 species of *Solanum* there are barely 40 which have pinnate leaves and tubers on the stolons, and these are confined to South and Central America.

There is so much that is common to all the *Solanum* species which have tubers and pinnate leaves, that we may fairly assume they have arisen from a single original type.

They are indigenous to Central America, possibly Mexico.

Professor Wittmack maintains that the *Solanum tuberosum* is a good species; he considers it the stock plant of our potato, which consequently, in his opinion, does not come from several species, as was believed.

He thinks also that other types of potato could be obtained from *S. Maglia* and *S. Commersoni*, which have already been improved by special attention.

104 **Potato Cultivation in the Netherlands.** (Rapport du Consulat de France a La Haye). — *Office du Gouvernement Général de l'Algérie*, p. 343. Paris, 15 Nov. 1910.

Netherlands

The cultivation of potatoes in the Netherlands has attained a wonderful development. In 1909, there were more than 160 000 hectares under cultivation, with a yield of 34 279 358 hectolitres, averaging about 206 hectolitres per hectare. The increase has been most noticeable in peaty soils, particularly in Friesland, and must be ascribed chiefly to the use of farm manure.

The ravages of potato disease are checked by a preparation of sulphate of copper and carbonate of sodium. *Borger Munster*, *Bleues Zélandaises*, *Magnum Bonum* and *Richter's Imperator* are the varieties most cultivated.

In 1908, 284 630 tons of potatoes were exported to Germany, Belgium, Great Britain, the United States and Norway, and smaller quantities to Guiana, Curaçao, the Antilles, Italy, Sweden, France and Turkey (1).

105

VALDIER. **Experiments in Cultivating Potatoes in Australia.** — *Office du Gouvernement général de l'Algérie,* pp. 343-344. Paris, 15 Nov. 1910.

Australia: New South Wales

In 1909-1910 experiments were made in New South Wales with all the different varieties of potatoes best known in the Colony, namely: Bliss Triumph, Brownell's Beauty, Cambridge Kidney, Coronation, Early Rose, Manhattan, Irvine Ruby, Satisfaction.

These experiments have shown that it would have been better to plant half a ton (508 kg.) of potatoes per acre, that is, about 1260 kg. per hectare, instead of only 8 cwt., or 406 $^2/_5$ kg.

4 cwt. of manure per acre, or about 500 kg. per hectare, were applied to the land where the potatoes were grown.

The following is the quantity used per half-ton of seeds-tubers:

Dried blood . . . . 4 cwt = 203 2 kg.
Superphosphate . . . 4 » = 203.2 »
Sulphate of potassium 2 » = 101.6 »

The average yield of each variety was:

	Ton	cwt					
Irvine Ruby	4	18	per acre,	about	12 400	kg.	per hect.
Coronation.	4	12	»	»	11 600	»	»
Brownell's Beauty . .	4	9	»	»	11 300	»	»
Cambridge Kidney . .	4	7	»	»	11 000	»	»
Satisfaction.	4	1	»	»	10 200	»	»
Bliss Triumph. . . .	3	10	»	»	8 800		»
Manhattan	3	9	»	»	8 750	»	»
Early Rose.	2	17	»	»	7 200	»	»

106

WINDIRSCH. **Experiments with Mangels in Bohemia.** (Ein zweijähriger Futterrubensorten. Anbauversuch). — *Deutsche Landw. Presse.* Berlin, December 14, 1910.

Austria: Bohemia

For several years, experiments have been made in Bohemia on 15 varieties of mangels, having large roots and luxuriant foliage. Among the

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(1) The following data show the remarkable progress in potato cultivation in the Netherlands:

POTATO CULTURE	Average 1871-80	Average 1881-90	Average 1891-900	Year 1906	Year 1907	Year 1908
Area in Hectares . .	135 310	144 330	151 788	161 114	158 223	159 887
Mean Yield per Hectare, in Hectolitres	136.0	154.0	180.5	209.0	210.0	213.0

One Hectolitre is equivalent to 2.75 bushels. *The Statesman's Yearbook,* 1910, p. 1037. [*Ed.*].

most appreciated varieties are Eckendorfer, Oberdorfer, Riesen Mammut, Chatocka, Cimbal, Ideal, Leutewitz, etc.

The mangels succeeded a rye crop which had been treated with farmyard manure and with sewage; they also had a top dressing of sewage.

The best results were obtained with the orange-yellow variety, *Cimbal*, which yielded 905 quintals of roots per hectare and 413 quintals of leaves.

107 A. Stutzer. **Experiments in Growing Jerusalem Artichokes** (1) **on the Shores of the Kurische Nehrung, East Prussia.** (Anbauversuche von Topinambour auf der Kurischen Nehrung). — *Die Ernahrung der Pflanze*, N. 1, pp. 1-3. Stassfurt, Jan. 1911.

Germany

The shores of the Kurische Nehrung, which extend for 100 kilometres at the North-Eastern extremity of Germany, seem well adapted for agriculture. The soil is sandy, and sufficiently moist at a depth of about 10 cm. (4 inches).

Some experiments have been made in growing Jerusalem artichokes here as food for cattle, which are very scarce in the district on account of the lack of suitable fodder. The experiments were made in two fields, each 25 *ares* in extent and divided into 5 parts. The following fertilizers were used for each part:

5 quintals of Thomas slag;

2 quintals of nitrate of sodium; and different proportions of kainit.

No farm manure was used, owing to the difficulty of transport.

It was found that the Jerusalem artichoke will grow in sandy soils where no other crop can be raised, with excellent results, when well manured, even if only with chemical fertilizers.

The Jerusalem artichoke may be used in a variety of ways as a food for cattle.

It is hoped that the cultivation of the Jerusalem artichoke may promote stock-breeding, as the experiments have been so successful.

There are two engravings in the text, showing the comparative development of the artichoke in manured and non-manured sandy soil.

108 A. Mazzaroni. **Comparative Experiments on the Value of Jerusalem Artichoke and "Helianti."** (See p. 101 of this Bulletin).

109 Dr. V. Weinzierl. **New species of Clover resembling *Trifolium repens*.** (Eine neue weisskleeähnliche Kleeart des Handels). — *Wiener Landwirtschaftliche Zeitung*, 61 J., N. 1, p. 3. Wien, 4 Januar 1911.

Austria

The Seed Experiment Station (k. k. Samenkontrollstation) of Vienna has, for some time, received samples of seed sold as *Trifolium repens*, which are really the seed of *T. parviflorum* Ehrh., the quality of which is very inferior, the plant being annual and its yield small.

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(1) *Helianthus tuberosus. Compositae.* [*Ed.*].

These seeds are distinguished from those of *T. repens* by their testae not being smooth, but covered with papillae.

110

BONAME. **Sugar-Cane Shoots as Forage in Mauritius.** — *Journal des Fabricants de Sucre*, Paris, 7 Déc. 1910

During the harvesting season, i. e. 5 months of the year, the tops of the sugar-cane *Macadam* are used for feeding both horses and cattle.

They are then the most abundant forage, and are employed by the Indians almost exclusively for their milch cows and breeding stock.

Although the leaves of the sugar-cane are not very nutritive, they are the only available forage at this time of the year, owing to drought and the general backwardness of vegetation.

Mauritius

During the rainy season, the luxuriant growth of suitable wild plants supplies most requirements, but later, these wild plants become so scarce that (but for the sugar-cane shoots) it would be necessary, in order to tide over the short period of dearth, to grow special crops, or else to store the abundant supply of the earlier months, either by drying, or placing in silos.

The entire tops of the canes are passed through a chaff-cutting machine, and then given to the animals either alone, or else mixed or moistened with molasses. The Indians, however, trim the head, removing the summit of the stalk and tips of the green leaves, leaving only the lower and more tender parts. Whether this method is worth the necessary labour, is a question which is solved by the following separate analyses of the different parts of the cane tops.

Parts analysed:

1) Large leaves;
2) Internal portions;
3) Extremities of leaves.

	Fresh material			Dried material		
	1	2	3	1	2	3
Water	80.60	80.00	67.80	—	—	—
Ash	1.11	1.76	1.92	5.75	8.80	5.95
Cellulose	5.96	6.75	11.19	30.74	33.76	34.74
Fatty substances	0.30	0.27	0.45	1.53	1.38	1.40
Sugar	3.55	0.89	0.75	18.32	4.45	2.35
Non-nitrogenous extractives	7.72	9.33	15.66	39.73	46.61	48.63
Albuminoids	0.76	1.00	2.23	2.93	5.00	6.93
Nitrogen	0.124	0.160	0.357	0.63	0.80	1.11

Weight for weight, the extremity of the leaf is more nutritive than the rest of the top of the shoot, but its physical condition must be taken into account, and also its smaller water content. *Macadam* is a useful food during the harvesting, but in proportion to its volume it is not sufficiently nutritive for draught animals and milch cows.

111 Brit. Cons. CAVE. **Experiments in Cotton Cultivation in Algeria.** — *The Board of Trade Journal.* London, 1 Dec. 1910.

Algeria

Great efforts are being made by the Algerian Government to encourage the planting of cotton. In 1908, four years after the first experiments had been started, a crop grown on irrigated land in the district of Orléansville was sold at Havre at 8 $^3/_4$ d. per lb., representing a net profit to the grower varying from £5 10 s. to £12 10 s. per acre.

The crops gathered on these lands have varied from 1200 to 2500 kg. of raw cotton, yielding from 380 to 800 kg. of ginned cotton per hectare, which, at the prices last quoted, with the addition of by-products at market prices, would yield a gross return of from 1400 to 3000 fr. per hectare. The cost of cultivation, in the case of the grower who shipped the above consignment, was 557 fr. per hectare. In some instances it is more. but it has never reached 1000 fr., so that it is estimated that the net profit on cotton-growing on these lands amounts to between 850 and 2000 fr. per hectare, or approximately from £14 to £32 per acre. This calculation is based on abnormally high prices, but at ordinary prices the profit would still be very large. Experiments, which have been uniformly successful, have also been conducted on lands unsuited to irrigation; at Philippeville 17 acres under Mississippi and 11 acres under Egyptian Mitafifi have yielded 154 cwts. and 85 cwts. of raw cotton respectively, whilst at Bona, 130 cwts, and 133 cwts. of these respective varieties have been obtained from two plots of ground, each of about 15 acres, giving an estimated net profit of £11 an acre.

It is pointed out that in the United States of America, the average net profit to the cotton grower, calculated over a period of 20 years, is between £1 18s. 6d. and £2 13s. 6d. per acre, whilst in Egypt it has been shown not to exceed £1 15s.

For these reasons, local agriculturists have been strongly urged to plant cotton, and several hundred additional acres are now in course of cultivation in Algeria.

(Hectare = 2.47 acres) (kg. = 2.2046 lbs.).

112 PRIESTLEY. **Cotton from Brazil.** — *Journal of the Royal Society of Arts.* London, Dec. 30, 1910.

Brazil

It will surprise many to be told that there is a larger cotton-growing area in Brazil than in the United States, although the amount of cotton actually grown in Brazil is barely one-third of that cultivated in the United

States. Millions of bales more could be grown in Brazil, if the cotton spinners of Lancashire would only take the matter up.

The Germans are quite alive to the cotton producing possibilities of the country, and within the last four months a wealthy German syndicate has secured three large tracts of land in three of the cotton-growing provinces of Brazil. Cotton flourishes in Brazil, for there are practically no pests, and though native labour is not very abundant, plenty of Italians are available.

Brazil would seem to offer the most promising field for cotton growing outside the United States.

Mauritius Hemp. — *Bull. Imperial Institute*, Vol. VIII, No 3. London, 1910. **113**

Samples of the fibre of *Furcroea gigantea* (the aloe fibre of Mauritius, which yields the product known in commerce as "Mauritius hemp)" (1) from the East Africa Protectorate, Uganda, Nyasaland, Southern Rhodesia, Natal, St. Helena, India and South Australia, have been examined at the Imperial Institute.

British Colonies

An account of the results obtained, and the quality and value of the fibres has been published in "*Colonial Reports*, Miscellaneous, No. 58."

SALEEBY. **Fibre Production in the Philippines.** — *The Philippine Agricultural Review*, No. 9, 1910. **114**

The production of *abaca* (2) has been gradually increasing for the past ten years, and it is estimated that the present year's crop will surpass that of last year.

This over production has been obtained at the cost of exhaustive cropping. The planters have been unable to resist the temptation of present profits, and have not concerned themselves with the deplorable effects that this method will have on future crops.

Philippines

The present yield is quite abnormal, and sooner or later must begin to fall off. A large number of fields of abaca, situated in different districts, are practically exhausted, and have to be replanted with other crops.

The principal places where a good quality of fibre is still produced are: North Samar, South-East Mindanao, West Leyte and the Eastern region of Sorsogon.

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(1) In 1908 the island of Mauritius exported 2108 tons of hemp, valued at £39 966 (frs. 1 009 415). [*Ed.*].

(2) The fibre known under the name of Manila Hemp, prepared from the *Musa textilis*. [*Ed.*].

115 A. and G. L. C. HOWARD. **Studies in Indian Fibre Plants. I. On two Varieties of Sann (*Crotalaria juncea*).** - (*Mem. Dept. Agr. India, Bot. Ser.* 3, 1910, No. 3, pp. 177-189, pls. 3). *Experiment Station Record*, November, 1910, p. 536.

British India

The botanical and cultural characters of a local variety of sann-hemp are compared with those of the Jubbulpore variety. Yields and chemical analyses are given and the results of tests of sann as a green manure for the tobacco crop are reported. References are given to the literature on the subject.

116 H. D'ANCHALD. **Bombax or Kapok Plants.** — *Journal d'Agriculture pratique*, n. 48, p. 702. Paris, 1er Décembre 1910

The Bombax (1) is a large tree frequently found in Guiana. Its seed is wrapped in a reddish fibre, not easily spun, but used in the manufacture of hats in these regions.

Guiana, British India etc.

The inhabitants of the Rienzi Islands use the *Bombax globosum* for stuffing pillows, cushions and arm-chairs. At the Universal Exhibition of Colombia there were samples of this stuffing material from Mexico. This fibre can only be spun when mixed with others.

Bombax malabaricum is widely distributed throughout India; *Bombax Mungaba* in Brazil, and *Bombax pubescens* is a large tree found in Equatorial Egypt.

117 **Rotation Cultivation of Rice and Jute and its Influence on the Rice Harvest of Bengal, British India.** See page 86 of this Bulletin.

118 **Sugar-Beet Culture in Great Britain.** — *Nature*, Nov. 17, 1910, No. 2142, Vol. 85, p. 85.

Great Britain

In the current number of the *Fortnightly Review*, Mr. J. Saxon Mills writes on the production of sugar from sugar-beet, which he regards as one of the most hopeful schemes yet suggested for the benefit of rural districts. All the arguments in favour of the crop are set out concisely, and some very persuasive statistics are given. Field trials in Lincolnshire, Suffolk, Essex, and at Newnham Paddox have shown that crops varying from 15 to 20 tons per acre can be obtained, containing 16 to 18 per cent of sugar, while the Continental crops are lower both in quantity and in sugar content. Indeed, sugar-beet is now grown on a commercial scale in parts of the Eastern counties, but it is shipped to Holland to be worked up in the Dutch factories.

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(1) *Bombax pentandrum* Linn. is generally known as *Eriodendron anfractuosum* D. C., a tree which furnishes Kapok. *Bombax malabaricum* gives a kapok of second quality. [*Ed.*].

He argues that factories would prove highly advantageous in English country districts, and would also be a remunerative investment. As several factories are already being started in England, it ought not to be long before definite information is forthcoming on this question.

119

The German Beet Harvest. (Lasst sich ein Ruckgang der Rubenernten in Deutschland nachweisen?). — *Blatter fur Zuckerrubenbau*, XVII Jahrgang, No. 23, pp. 373-375. Berlin, 15 Dec. 1910.

Germany

It is generally believed that the increased sugar content of the German beet is proportional to the decrease in the yield. We here find a table of the beet harvests in Germany from 1871 to 1910, from which it appears that neither a quantitative decrease, nor a relation between yield and sugar, can, with any certainty, be proved.

The five year averages are calculated from the annual yields as follows:

Season	Yield per Hectare metric quintals	Sugar Percentage	Sugar per Hectare metric quintals
1906-7 to 1910-1 . .	299.6	15.55	46.55
1901-2 to 1905-6 . .	295.6	14.42	42.51
1896-7 to 1900-1 . .	303	13.3	40.10
1891-2 to 1895-6 . . .	295	12.32	36.37
1886-7 to 1890-1 . . .	290.4	12.27	36.60
1881-2 to 1885-6 . . .	311.4	10.37	32.26
1876-7 to 1880-1 . . .	278.8	8.76	24.57
1871-2 to 1875-6 . . .	245.8	8.58	21.03

120

H. K. GÜNTHER. **Cultivation Experiments with Natural and Prepared Beet-root Seeds.** (Anbauversuche mit naturellen und praparierten Rubensamen). – *Blatter fur Zuckerrubenbau*, XVII J., No. 24, pp. 380-393. Berlin, Dez. 31, 1910.

Germany

Some very interesting cultivation experiments have been made with natural and prepared (husked and impregnated) beet-root seeds.

The first series was carried out on 8 plots of the same clay soil, in rotation after farm-manured winter wheat, followed by vetch. Later on, two quintals of Thomas slag were used, 2 quintals of kainit and 2 quintals of nitrate of sodium per 0.255 hectare; and in the middle of April 7.5 kg. of natural seed and 5 kg. of prepared seed were sown per 0.255 hectare. The results were as follows:

Seed	Beet crop per 0.255 hectare	Sugar crop
1. C. Braune, natural . .	84 qs. (100 kg.)	13.85 qs. (100 kg.)
2. C. Behrens and C. nat. .	79.5 »	13.25 »
3. Dr. W. Rimpau, nat. .	87.5 »	14.9 »
4. C. Vorstadt, prepared .	87 »	14.4 »
5. Strube, nat.	81 »	13.3 »
6. O. Breustedt, nat. . .	82 »	14 »
7. Dr. Bergmann, nat. . .	99.5 »	16.9 (15.5)
8. Dr. Bergmann, prepared	82.5 »	(13.6) (1)

The second series was made on 8 plots divided into two groups, one with natural seeds, 7.5 kg. per 0.255 hectare, the other with prepared seeds, 4 kg. per 0.255 hectare, all other conditions being equal.

The germinating capacity of the natural seed was 160 shoots, and that of the prepared seed 178. The results were as follows:

Seed	Beet crop per 0.255 hectare	Sugar crop
Natural	89.5 qs.	15.5 qs.
Prepared	97 »	16.8 »

These results are a confirmation of the direct economic advantages to be obtained with prepared seeds, without speaking of the indirect advantages, especially that of resistance to parasites.

Many sugar factories, especially in East Prussia, are in favour of prepared seeds.

121 K. Andrlik, V. Bartosch and J. Urban (Report by H. Brien). **Injurious Effects on Sugar Beets of Cross-Fertilisation with Mangels.** (Fremdbefruchtung bei Rüben). — (*Zeitschrift fur Zuckerindustrie in Bohmen*, Heft 1, Prag, 1910). *Centralblatt fur die Zuckerindustrie*, XIX J., N. 9, pp. 256-257. Magdeburg, Nov. 26, 1910.

Austria: Bohemia

These are the results of some pollination experiments between sugar beets and mangels, and they once more demonstrate the damage which this process may cause.

A sugar beet was halved, and one part planted among mangels (mammoth beets), the other a long way off, near some sugar beets. A year after, the seed taken from both these halves was sown in parallel rows, and under identical conditions of soil and manure. The seed obtained from the half which had been pollinated by the mangels, yielded 19 per cent of white beets and 81 per cent of red ones. The analysis of these and of the beets which had sprung from the half pollinated by the sugar beets gave the following results.

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(1) According to polarimetric tests made 20 days before delivering to the sugar factory.

		Percentage of sugar
Sugar beets × mangels:	red	14.8
	white	15.1
Sugar beets × sugar beets		18.52

The cross fertilisation induced several other important changes:

	Decrease per cent		Increase per cent
	Dry substance	total nitrogen	Ash
Varying from. .	18.8	9.5	26.8
to. .	25.5	10	27.3

The amount of injurious ash was also greatly increased, up to 59 per cent, a fact which is chiefly to be attributed to the effect of the alkalis. The shape of the roots of the red hybrids was permanently modified.

The conclusion reached is that the greatest possible uniformity should be aimed at in the cultivation of sugar beets, and that they should on no account be grown in the neighbourhood of mangels.

L. MONTEMARTINI. **The Premature Blooming of Sugar-beets.** (La fioritura precoce delle barbabietole). -- *Rivista di Patologia vegetale*, anno IV, n. 16, pp. 255-256. Pavia, Nov. 1910. **122**

Italy

The management of sugar-beet plantations has often to meet a difficulty, especially when the spring has been cold and damp; namely the premature flowering of the plants during the first year. Instead of developing big roots, with abundance of sugar, they become exhausted in the production of stalk and flowers and in the maturing of seeds.

The writer has made experiments with the object of establishing whether this is to be attributed, as has been suggested, to a modification (due to the cold) of the relations between the hydrocarbons and the nitrogenous substances of the plant, or else, as others think, to external causes of the most varied nature.

Phosphorus being in excess of nitrogen, according to Wimmer and Roemer, increases the amount of sugar in beetroots; it stimulates also the flowering of the plants (though whether on account of the above mentioned fact or not, is not yet known). It therefore seems likely that low temperatures in spring exercise an influence on the premature flowering of beetroots in so far that they encourage an increased absorption of phosphorus. If these points could be established with precision, it would be possible to avoid this difficulty by opportune manuring, retarding the application of phosphates to young plants until the danger of sudden lowering of temperature was over.

About the commencement of March, 1910, several small plants of beetroot were placed in a cool green house, in pots containing sand which had been carefully washed; to some of these calcium phosphate and a little sulphate of magnesium had previously been added as fertilisers and to others, nitrate of potassium and a little sulphate of magnesium.

In August it was found that 50 % of the plants kept in the green house, including those manured with phosphate and with nitrate respectively, were in bloom. Of those left in the open air from the month of March, 83 % of the plants fertilized with phosphate. and only 75 % of those fertilised with nitrate, were in flower.

Therefore there is every reason to believe, that with an initial use of nitrogen in excess, or even of this substance exclusively, (which could only be done by sowing in washed sand with the purpose of transplanting later on), it will be possible to avoid, at least in part, the trouble caused to plants by cold during spring.

Further experiments in this direction would establish the fact.

123 P. SCHUBART. **Influence of Early and Late Cultivation on the Formation of Flowers during the First Year and on the Crops of Sugar Beet.** (Früh-und Spätbestellung der Rüben. Schoss und Ernte). - *Centralblatt fur die Zuckerindustrie*, XIX. Jahrgang, No. 12, pp. 359-360. Magdeburg, December 17, 1910.

Germany The results are given of some interesting experiments on early and late cultivation of a selected variety of beet which gives no flowers the first year. The following data were obtained:

Plot	Seed time	Earthing up	Shoots on 10 000 plants on Sept. 1st	Beets per Hect. qs	Sugar per Hect qs
1	11 Mar.	13 May	3782	383	58.29
2	19 »	13 »	2775	387	60.99
3	24	13	1434	388	61.11
4	1 Apr.	13	579	395	62.77
5	7	18 »	408	338	73·45
6	14 »	23 »	486	320	56.38
7	22	23 »	87	380	63.42
8	28	29	34	348	57·94
9	6 May	29 »	18	270	44·44
10	13 »	31	7	222	36.19
11	20	14 June	0	187	29.17
12	27	14 »	0	142	20.93

The crops were gathered on September 21st. The first plots, which developed almost simultaneously, gave practically equal crops, with the same sugar content; they also seemed more vigorous at first, especially in comparison with the plots that were sown late, but in September the difference was scarcely appreciable.

The writer came to the conclusion that the variety of beets without floral shoots must not be sown too early, because the late frosts during the germination period are, as is well known, the chief factor in the formation of flowers.

O. Classen. **Influence of the Chemical Composition of Beetroot on its Sugar Content.** (Die chemische Struktur und deren Einfluss auf das Zuckergehalt des *Beta vulgaris*) — *Chemiker Zeitung*, No. 149, pp. 1329-1330. Cothen, Dec 1910. 124

Mr. Classen observed some beets of a particular structure last year in the sugar factory of Teutschenthal. The beets were of the Klein-Wanzleben variety, and the roots were bifurcated, having numerous lateral roots. Half an hour to three hours after washing, the colour of the beets became deep, almost black, and when they were cut across, they were seen to be circled with rings of a dark, blackish-blue colour. The cellular juice had a bitter taste. Germany

Mr. Classen made some chemical examinations of the diseased beets, and came to the conclusion that the alteration of the roots was due to phenomena connected with the nutrition of the plant. The analysis revealed a low sugar content and a high ash content. The results of the analyses were as follows:

Order of experiments	I	II	III	IV	Average	Normal Beet
Weight in grams	685	510	570	745	627.5	780
Intensity of alteration	strong	weak	weak	average	—	—
Sugar content alcoholic extract	8.9	7.3	8.6	12.8	9.40	17.1
by digestion in water	9.8	7.4	8.6	12.6	9.32	17.4
Ash	7.24	6.11	7.24	5.89	6.33	0.71
Water content	78.56	80.03	79.51	77.73	78.06	80.46
Organic non-sugar	5.35	6.50	4.64	3.67	5.04	1.43
Total non-sugar	12.59	12.61	11.88	9.56	11.37	2.14
Quotient of actual purity	41.28	36.82	41.99	56.59	45.78	89.04

The numerous lateral roots in the diseased plant showed clearly, that the plants had suffered from the dryness of the soil, while the remarkable percentage of ash can be explained by the fact that the sudden presence of moisture determined a strong assimilation of water and of salts in the plant. The proportion of salts was excessive, and they must have had a fatal influence on the physiological conditions of the plant.

The content in iron, alumina, magnesia, soda, phosphorus and sulphur in sound and diseased beets was practically the same, but there was found to be a slight difference in the potash, silica and chlorine contents. The writer thinks the reason why the diseased beets contained such a large proportion of these elements, as compared to the sound beets is, that as soon as the soil absorbs moisture, the beets assimilate with the water the more soluble salts contained in it, that is to say, the potassic salts in preference to the salts of calcium, assimilated in smaller quantities.

It is well known that potassium has a greater affinity than calcium for acids and organic bases. The potassic salts may be partly transformed later on into chlorides, and thus increase the percentage of chlorine.

To avoid these drawbacks due to phenomena of over nutrition, the writer advises the irrigation of very rich soils.

125 F. Strohmer. **Change of Climate has no Effect upon the Sugar Content of Selected Beetroots.** (Untersuchungen uber die Klimafestigkeit der Zuckerrübe. (*Mitt. der chemisch-technischen Versuchsstation des Zentralver. f. die Rübenzuckerindustrie*, § IV, N. 20). *Oesterr.-Ung. Zeitschr. f. Zuckerindustrie u. Landwirtschaft*, XXXIX J., 6 H., pp. 919-941. Wien, 1910.

Austria In 1900, seed-beetroots from the culture station at Wohanka were cultivated on a plot of ground 1050 m. above sea level and thus in an alpine climate. The resulting seeds were afterwards sown in Hungary and in Lower Austria.

The growth of seed in a rigorous climate appears to strengthen the biennial tendency of the beetroots in spite of late cold (1).

Analyses showed that there is no appreciable difference in the sugar content of beetroots from ordinary seed and from that of plants cultivated at 1050 m. Therefore, beetroots obtained by individual selection acquire a hereditary characteristic independent of environment, since it is not modified by an extreme variation of climate experienced by an intermediate generation.

The same holds good for the other characteristics (besides sugar content) which determine the value of the sugar-beet, such as the amount of ash and of nitrogenous substances, which cannot only be fixed by careful modern selection, but can also be made independent of climate. But, at the same time, the seeds of seed-beetroots rich in sugar, but with feeble germinating energy, inherit a weaker capacity of germination.

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(1) The tendency of beetroots to become annual, instead of biennial, is a semi-latent characteristic which, as is well known, is stimulated by late cold. [*Ed.*].

Although these seeds may bring forth descendants with excellent characteristics, only seed beetroots rich in sugar and with the greatest power of germination should be cultivated, for these alone yield seed which, under ordinary circumstances, give rise to assured progeny.

It should further be observed, that beetroot seeds with large glomerules, and those with normal ones may give rise to plants of equal properties, but as the seeds with small glomerules have less germinating power, their use entails a risk of poor crops, unless more seeds are sown.

The Demerara Sugar-cane Seedling 95. — *The Louisiana Planter and Sugar Manufacturer*, Vol. XLV, N. 23, pp. 354-355. New Orleans, Dec. 3, 1910. 126

United States: Louisiana

The variety of sugar cane *Demerara 95* is considered the best for newly reclaimed lands, and generally speaking, in the whole of Louisiana. Its yield is even greater than that of *Demerara 74*.

Both resist the wind better than the local *Ribbon* variety, and the *Demerara 95* has this advantage over *Demerara 74*, that whereas the latter breaks under the influence of strong winds, the former only bends. Another advantage of *Demerara 95* is that it ripens better and even more readily in soils that have recently been improved. Its sugar content is as high, or nearly so, as that of the *Demerara 74*, and its juice is decidedly purer.

A higher degree of cultivation is required for the *Demerara 95* and the *Demerara 74* than is necessary for the local variety, and they are more difficult to cut.

The *Demerara 95* appears to ratoon much better than the *Demerara 74*, and perhaps better even than the *Ribbon* variety.

A. MAZZARONI. **Comparative Experiments on the Value of Jerusalem Artichoke and "Helianti."** (Esperienza comparativa sul valore del topinambour et dell'Helianti). — *Staz. Speriment. Agr. It.*, Vol. XLIII, fasc VII-IX, pp. 660-666. Modena, 1910. 127

Italy

Some rhizomes of Helianti (*Helianthus decapetalus*) were planted in very fertile soil belonging to the Pomological School of Florence, two varieties of Jerusalem artichoke (*Topinambour patata* and *Topinambour blanc amélioré*) being planted at a few metres distance. The treatment was identical in each case. The Helianti yielded 49 037 kilog. of rhizomes per hectare, and the Jerusalem artichokes 146 635 kg.

The Helianti is undoubtedly valuable for distillery purposes, but it is not equal to the Jerusalem artichoke, considering the abundant crop obtained from those over the same area. Analyses of the tubers of the two plants gave the following results:

Composition	Jerusalem Artichoke %	Helianti %
Water	83.33	75.20
Dry matter at 105°C	16.67	24.80
Starch-producing substances in 100 p. of dry matter .	64.62	56.32
in 100 p. of fresh matter	10.34	14.08

The following analytical table shows the ratio of substances of alimentable in 100 p. of fresh product:

Composition Raw substances	Jerusalem Artichoke %	Helianti %
Non nitrogenous extractive matter	12.01	16.92
Fats	0.29	0.36
Protein	1 38	2.93
Cellulose	1 69	2.83
Mineral matter	1.10	1.76
Digestible substances		
Non nitrogenous extractive matter	11.76	16.56
Fats	0.17	0.22
Protein	1.10	2.34
Cellulose.	1.01	1.69

The nutritive units in 100 parts of fodder are, for Helianti 20 27, and for Jerusalem artichokes 13.77. But considering the difference in the yield of the two, as well as the data of analysis, the number of nutritive units per hectare of Jerusalem artichokes is seen to be much greater. The writer considers that the Jerusalem artichoke is always preferable, at any rate in rich soil like that in which the Experiment was conducted.

128 **Sunflower Growing in Russia.** — *Journal of the Royal Society of Arts*, N. 5029, Dec. 9, 1910. p. 110.

Russia

The sunflower is grown in Russia to a considerable extent, the amount of seed crushed exceeding annually half a million tons. At first the centre of its cultivation was in the Provinces of Tchernigov, Kief, Poltawa, and Kharkov, but now the plant is chiefly raised further south-east in the Province of Stavropol. Much of the seed is eaten either raw or roasted; the greater part, however, is crushed for its oil. Since the introduction of improved methods of refining, a very palatable oil, with a clear pale yellow tint, has been produced. As a rule it is shipped in ordinary wooden casks, although lately tin cans have been used successfully. Small trial shipments have been made, curiously enough, to those Mediterranean countries which are famous for their olive oil—probably it is used by the inhabitants who find it more profitable to export the valuable olive oil.

129 A. VILLIERS, E. COLLIN and M. FAGOLLE. **Sunflower Oil.** — *Aliments lactés et aliments gras. Traité des falsifications et altérations des substances alimentaires.* Paris, O. Doin, 1911, pp. 1-350.

Russia. Hungary. India. China.

Sunflower oil is furnished by the seeds of *Helianthus annuus*, and is produced in large quantities in Russia, Hungary, India and China. It is extracted by hot pressure, and is used for lighting purposes, and in the manufacture of soap and varnish. The first product is obtained by cold pressure, and is used for the table, for lamps and as a drying oil. It is called *Sunflower Oil* in England, *Olio di Girasole* in Italy and Spain, and *Huile de tournesol* in France.

The importance of this oil may be seen from the fact that in 1906 60 000 tons of oil-cake were manufactured from the residue of the *Helianthus* in the Northern Caucasus. The following is the analysis of sunflower oil:

Density at 15 °C	0.525
Oleo-refractometer deviation	+22°
Index of saponification	192
Iodine index	124
Critical solution temperature in 94° alcohol	104°
Melting point of the fatty acids	22°
Non-saponifiable substances	0.72 %

130 C. BERNARD. **On the Presence of Ferments in Fermenting Tea, and their Probable Influence on the Aroma of Tea-leaves.** (Sur la presence des levures dans le thé en fermentation et leur influence éventuelle sur cette fermentation). — (*Bull. Départ. Agric. Indes néerlandaises*, N. 36, 1910). *Botanisches Centralblatt*, Bd. 114, N. 24, p. 617. Jena, 13 Dez. 1910.

Dutch Indies

The fermentation of tea depends on processes of oxidation, and it is considered that the soluble ferments of the oxidising group are favourable to the above processes, or bring them about. But there is reason to believe that microorganisms take part in the process to an extent which still remains to be determined, especially in developing aroma.

Amongst the microorganisms, a yeast has been isolated which occurs on the tea leaves in the gardens in Java, and which develops abundantly during the course of the various manipulations.

This yeast seems constant in the different plantations and under most varying circumstances, in any case, it has no unfavourable effect upon the teas from the point of view of fermentation.

It is possible that these yeasts have a beneficial action, but this is certainly not the case with the bacteria, which are harmful, and if they develop greatly in the fermenting tea, they impart to it an unpleasant odour and a viscid consistency.

131 **A Substitute for Tea: *Catha Edulis.*** — *Revue Générale des Sciences pures et appliquées*, N. 22, p. 921. Paris, 30 Nov. 1910.

Afghanistan

Mr. J. F. Owen, Chemist to the Afghan Government, draws attention to the properties of *Catha edulis* (1). It contains a substance similar to caffein, from which a beverage tasting like tea is made. The natives of Afghanistan by its use are able to make long night marches without fatigue; it increases the muscular force of man and soothes neuralgic pains. The dried leaves are crushed and boiled in water for 15 minutes.

132 **Parana Maté (Brazil).** — *Recueil consulaire publié par le Ministère des Affaires étrangères du Royaume de Belgique*, T. 151, 1^re^ Livr., pp. 83-85. Bruxelles, 1910.

Brazil

Herva maté forms 90 per cent of the exports of Parana; 36 641 000 kg. of maté, of the value of 18 320 *contos* (27 480 000 frs.), were exported in 1908-1909. The *Ilex Paraguayensis* or *Braziliensis*, which supplies the maté tea, grows wild on all the high parts of Paraguay, the Southern States of Brazil and the North of Argentina; its average height, when full grown, is 5 or 6 metres. Parana abounds in *hervaes*, i. e. under-wood of *herva maté*, especially in the pine forests. Important districts of production in the State are: Palmeira, Lapa, Saô Matheus, Porto Uniaô da Victoria, Rio Claro, Guarapuava Palmas, Imbituva and Ypiranga. The plant is also found in the forests through which the Saô Paulo - Rio Grande Railway passes between Porto da Uniaô and Ponta Grossa.

The crop is gathered either from wild virgin *hervae*, which many people are engaged in discovering, or from *hervae* which have already been utilised. The crop must be gathered only once in three years, but the tree may be utilised for 30 years.

Maté is prepared as follows: the leaves are first roasted on the spot where the crop has been gathered, and yellowed by being completely dried, when they are beaten on an earthen threshing floor, called *cancha*. The tea can then be put on the market, but if a superior quality is desired, it must be refined, after being perfectly dried, by being put through a machinery of classifying ventilators and pestles, which cleanse it, break it up in various ways, according to the quality desired, or reduce it to powder. There are about thirty factories in Parana, half of them being at Curityba, for the preparation of maté.

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(1) *Catha Edulis*, Forsk. (*Celastrus edulis*, Vahl.) is a shrub of the family Celastraceae, which grows in Arabia and in Tropical East and South Africa. Professor Schär of Zürich has obtained an alkaloid from it which he has called *Katine*. According to Dr. Paul, the leaves also contain a particular tannin similar to that of tea, coffee and cocoa. The fresh or dried leaves are chewed, they stimulate like coffee.

(See DUJARDIN-BEAUMETZ et EGASSE, *Les plantes médicinales indigènes et exotiques*. Paris, 1889). [*Ed.*].

G. BERTRAND and T. DEVUYST. **The Chemical Composition of Brazilian Maté and of the Infusion of Maté.**[1] — (*Bull. Sc. pharm.*, XVII, p. 249, 1910). *Botanisches Centralblatt*, Band. 114, N. 19, p. 495. Jena, 8 Nov. 1910. **133**

Brazil Paraguay etc.

Maté is obtained from the leaves of *Ilex paraguayensis*, Saint-Hil. (1). It contains about 2 $^{\circ}/_{0}$ caffein and 11 $^{\circ}/_{0}$ tannin. The greater part of the soluble substance (63 $^{\circ}/_{0}$) passes into the infusion, which contains 1.39 $^{\circ}/_{0}$ caffein and 7.68 tannin (2).

New Method of Cacao Cultivation at Tobago. — *Department of Agriculture*, Trinidad. Special Bulletin (Annual), p. 21. Port-of-Spain, 1910. **134**

Two small plots at the Botanic Station, Tobago, are under cacao, which is cultivated differently from the usual method.

The trees are vigorous and healthy, and the number of pods increases.

The same system has been adopted on large estates for several years past with the best of results. **Tobago**

The system falls under four heads for trees in bearing: No overhead shade; heavy and regular mulches of grass, etc.; encouragement of sucker-growths (chupons), very slight pruning. Besides this, the land is well drained and, where necessary, screened from high winds by shelter-belts (wind breaks).

Canker and other diseases of the cacao tree have little chance of obtaining a foothold when this mode of cultivation is employed.

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(1) In the *Index Kewensis* is found. *I. paraguensis*, A. St. Hil. *(paraguariensis)* fam. *Ilicineae;* fam. *Aquifoliaceae* according to ENGLER, *Syllabus der Pflanzenfamilien*, 6 Aufl., p. 102. Berlin, 1909. [*Ed.*].

(2) According to T. PECKOLT, the air-dried leaves of *Ilex paraguayens* from the Orgu mountains contain 6.39 $^{\circ}/_{00}$ of thein; desiccated leaves of Maté of Parana contain 44.97 $^{\circ}/_{00}$ of tannic acid, which in the commercial product is reduced to 16.75 $^{\circ}/_{00}$; in these dry leaves of Parana Maté the thein is 16.75 $^{\circ}/_{00}$ and in the commercial Maté only 5.55 $^{\circ}/_{00}$ (See A. and MEREDITH WYNTER BLYTH, *Foods Their Composition and Analysis*, 6th Edition, p. 345 London, 1909).

Three kinds of Mate are to be distinguished:

1. *Caa-cuy*. These are the young leaves of recently grown branches. They are of delicate texture and yellow in colour, and have an agreeable perfume. They are not found in commerce.

2. *Caa-mirim*. Leaves carefully cleaned and even deprived of the mid-rib. This kind is much esteemed in Peru and is called *Herva mansa*.

3. *Caa-guaza*. (*Caa-una*, *Yerva de Palos*) This is the most inferior kind and is composed of large and old leaves mixed with pieces of wood and twigs. The odour is strong and unpleasant.

See DUJARDIN-BEAUMETZ et EGASSE, *Les Plantes médicinales, indigènes et exotiques*, p. 442. Paris, 1889. [*Ed.*].

135 CADBURY. **Cacao Cultivation in Portuguese West Africa** *Labour in Portuguese West Africa*. — London. Routledge. 1910, p. 31.

S. Thomé and Principe

The industry of the two islands of S. Thomé and Principe has been for twenty years almost exclusively the cultivation of cacao. Formerly, sugar and coffee were largely grown, and a small quantity of high grade coffee is still exported, as well as a little cinchona bark from the hills. Palm kernels and coco-nuts are found on some estates; a few enterprising managers are planting rubber. There is no doubt that the fertility of the volcanic soil, the cheapness of labour and the energy and enterprise of the Portuguese have made S. Thomé one of the wealthiest islands in the world. The total area is about 370 square miles, of which about 175 square miles (50 000 hectares) are under cultivation. The total estimated output of cacao is 27 000 tons, 4.34 cwts. per acre (168 kg. per hectare).

The cultivation of cacao is one of the healthiest of all tropical industries. The crop is harvested over many months, and there is no need for overtime during some weeks in the year, as on a sugar estate, where the ripe canes must be rushed to the mills. Cacao grows well up to 1500 feet above the sea level and is planted, in a few favoured districts, as high as 2500 feet.

The Government has no Botanical Station, and the success of the island cacao industry is entirely due to private enterprise.

136 **Tobacco Cultivation in South Australia and in the Northern Territory.** — *The Board of Trade Journal.* London, 1 Dec. 1910.

South Australia

The possibilities of successful tobacco-growing in the Northern Territory of Australia have long been recognised. In the Botanical Gardens at Port Darwin, small plots have been planted with tobacco during several successive years, and very satisfactory results have been obtained. The Curator of the Gardens, in his report for 1900, states that it seems beyond doubt that the soil and climate of the Northern Territory will produce as good cigar leaf as any part of the world. Neither can there be any reasonable doubt but that the production of such leaf would be highly profitable, even with European labour.

Attention has lately been called to the possibilities of tobacco cultivation in the south-eastern portion of South Australia, the latitude of which corresponds approximately to that of Virginia. Experiments made at Mount Gambier show that the tobacco leaf makes excellent growth in that locality, and samples submitted to experts have been pronounced to be of good quality.

H. FABRE. **Cultivation of Tobacco for the Production of Nicotine.** — *Progrès agricole et viticole*, N. 51, p. 743. Montpellier, Dec. 18, 1910. **137**

France

Mr. Schloesing, Junior, has been making some experiments as to the most economical conditions for the production of nicotine, chiefly on the influence of:

1. compactness of the plantations;
2. number of leaves left on each plant:
3. variety, and climate;
4. manuring with nitrate.

The experiments were made in Ille-et-Vilaine with the *Auriac* variety, and in Lot with the *Nykerke*. Each of the four plots of land was an *are* in extent, and they were planted with 10 000, 20 000, 40 000, and 80 000 plants to the hectare respectively, the first two were fertilised with 300 kg. of nitrate of sodium per hectare, and the others with 800 kg.

The most satisfactory of these plots, that of 300 kg. of nitrate, 20 000 plants to the hectare and 6 leaves on each plant, only yielded 156 kg. of nicotine per hectare.

Thus, the yield is not much heavier under the best, than under ordinary conditions, so not much is to be gained by changing them. The present sale price of tobacco and of nicotine would not permit of tobacco being cultivated in France solely for extracting nicotine. Under the most advantageous conditions, the cost price would be much greater than the sale price.

GAGE. **The Government Cinchona Plantation and Cinchona-Bark Production in Bengal.** — *The Tropical Agriculturist*. Colombo, Nov. 1910. **138**

British India: Bengal: Madras.

There are in Bengal two plantations of cinchona, at Mungpoo and at Mungsong. The total number of cinchona plants on both plantations was 2 654 000 — a decrease of 303 804 since last year. Of the total number of plants 2 172 926 were *C. Ledgeriana*, the remainder being chiefly hybrids, *C. Succirubra* and *C. Officinalis*.

The total bark harvest amounted to 326 560 lb. of dried bark.

The total number of plants uprooted was 454 304. This gives an average of 11$^1/_2$ ounces (equal to about 370 grams) of dried bark per plant uprooted.

The sale of quinine sulphate rose from 18 585 lb. in 1908-9 to 23 899 lb. in 1909-10. The increased distribution of quinine sulphate has been chiefly due to the expansion of the pice-packet system, (one pice equals one farthing).

Cinchona-Cultivation in Madras. — *Chemist and Druggist*, p. 64. London, Nov. 12, 1910. **139**

British India

The Government plantations of cinchona in the Nilgiris extend over 1 148 acres, with more than 2 225 000 mature and 700 000 immature plants, the total yield being 255 371 lb.

The crop of 1909 is said to be the largest on record. The private plantations are distributed in Coimbatore, Malabar, the Nilgiris and Travancore, and the total yield of bark in these was 246 000 lb.

140 **New Medicinal and Edible plants in German South-West Africa.** (Heilpflanzen in Deutsch Sud West Africa). — *Deutsche Kolonial Zeitung*, p. 788. Berlin, 10 Nov. 1910.

German South West Africa

The Imperial Government of German South-West Africa has sent to the Colonial Institute of Hamburg an interesting collection of little-known plants, which the natives use both as medicine and food.

The following may be mentioned:

Tarro (*Pellaea hastata*) a fern, from which the natives make tea.

Ganeb (*Ocymum fruticulosum*) used in the same way.

Gumus (*Babiana* spec.), the roots of which are eaten raw or roasted.

Unkies (*Cyperus usitatus*), the meal of which is also eaten by the Colonial troops

The roots of Zovobib (*Solanum incanum*) are used by the natives as a remedy for gonorrhoea.

141 G. BADERMANN. **Prospects of Medicinal Plant Cultivation in the German Colonies.** — (Die Kultur offizineller Pflanzen in den Deutschen Schutzgebieten. (*Arch. d. Pharmazie*, 248. 257-265); *Zeitschrift für angewandte Chemie* XXIII J., H. 45, pp. 2145-46. Leipzig, Nov. 11, 1910.

German Colonies

The cultivation and utilisation of medicinal plants, recently begun on systematic lines in the German Colonies, is promising well. This industry is already flourishing in German East Africa, and is giving good results also in Togo, where it is being considerably developed.

The industry is still in the experimental stage in Kamerun.

The cultivation of cinchona has been begun in German South-West Africa.

There is no great production of medicinal plants in Kiau-Chau.

142 V. CAYLA. **Condition of Indigo Culture.** — *Journal d'Agriculture tropicale*, Paris, 113, 30 Nov. 1910.

Germany. Java. India. Salvador.

The production of synthetic indigo has been a great blow to that of natural indigo.

It is ten years since the exportation of the former became at all extensive, but during the long period of study, which was necessary to perfect the industry, no steps were taken to protect the natural product, and indigo planters were satisfied with crops of very inferior quality.

Thanks to the activity of the "Badische Anilin und Soda Fabrik," the exportation of German synthetic indigo has increased from 508 000 kg. in 1897, to 11 165 000 kg. in 1905.

The value of the natural dye of a good quality has, of necessity, enormously decreased, while inferior qualities have almost disappeared from the markets of the world.

Many countries have abandoned indigo cultivation, which is at present only carried on in Java, India, and Salvador, the latter State still furnishing a kind known as Guatemala.

The Javanese indigo has always been excellent in quality, but small in quantity.

In India, the permanent lowering of price due to the competition of the synthetic product, has been a death-blow to the small indigo-industry. Only the European cultivators of Behar have been able to hold their own; they have formed an Association, and having the support of the Indian Government, have undertaken and subsidized extensive researches for the improvement of cultivation and manufacture of indigo. The results of these rather late researches permit of the hope of a revival of the industry.

Extraction of Iris Essence. — *Bull. Sem., Schimmel et Cie.*, Miltitz, near Leipzig, Oct. 1910, p. 74. 143

M. F. Robert states that the extraction of the essence of iris by steam distillation is an obsolete process, requiring much time and trouble, whilst the apparatus used is injured by the fatty acids distilled.

In place of this, he suggests a method of extraction which consists of the repeated exhaustion of the pulverised root by a suitable solvent. **France**

According to M. Robert, in place of the very inflammable petrol ether which is generally employed, it is better to use non-combustible liquids, such as bichloride and trichloride of ethylene; this, however, has the disadvantage of freeing a little hydrochloric acid in the presence of damp.

When the solvent has sufficiently absorbed the soluble compounds, it is distilled in a vacuum or simply evaporated, and the residue treated with alcohol to free it from waxy and resinous matter.

The alcoholic extract is used as such, or else the alcohol is distilled, leaving an extract of iris with a very strong and agreeable perfume from which the pure essence is obtained by rectifying.

This method is very advantageous, inasmuch as the perfumer can prepare with little trouble concentrated extract of iris root. The extracted powder can be used for the preparation of cheap products, which makes this process yet more profitable.

Its light colour makes it very suitable for mixtures which should be as colourless as possible.

144 **Experiments in the Cultivation of *Liatris Spicata* in France.** – *Bull. Sem. Schimmel et Cie.* Miltitz, near Leipzig. Oct., 1910. p. 145.

Most successful experiments have been made at Marseilles by M. N. Davin on the cultivation of *Liatris spicata*, Willd, one of the native compositae of North America. This plant does not contain as much coumarin as *Liatris odoratissima*, Willd, though it is used for scenting cigars and linen, and for other domestic purposes.

France

Liatris spicata is a herbaceous perennial plant and is propagated in spring by dividing the tufts. It grows many leaves and springs from a tubercular rhizome. The leaves are narrow and alternate, with entire margins.

It has not yet been possible to acclimatise the allied species, *Liatris odoratissima* (1).

145 **Lavender Growing in England.** — *Bull. Sem. Schimmel et Cie.*, p. 77. Miltitz, near Leipzig, Oct.-Nov. 1910.

Lavender in England is nearly always grown on calcareous soils, and the chief centres of production are Mitcham, Hitchen, and Canterbury, and in Dorset.

Great Britain

A calcareous soil used to be thought necessary for the satisfactory growth of this plant, but some years ago it was found that lavender would grow perfectly well in the sandy soil of Bournemouth, not far from the sea, where lavender is now cultivated on a large scale.

The Downs in the South of England are especially suitable for lavender, for their soil is easily drained, lavender preferring a dry soil; it is very sensitive to the wind, the flower stems being easily broken.

It is advisable to use hedges and trees as windbreaks, but there must not be too much shade. One or two crops of flowers may be had the first year, but the plant does not reach its full development until the third summer. The plantation must be renewed at the end of five years,

There are several varieties of lavender, such as the Mitcham, Hitchen and Chappenhall, but they cannot be called varieties in the botanical sense of the word.

The best month to begin planting is October, and it is well to plant at regular intervals of two or three weeks, so that the crops may be gathered over a long period. The soil must be well tilled, cleared of weeds and manured with farm manure. The slips should be planted in lines running from North to South, 6 feet (1.83 m.) apart, the plants being placed 4 feet (1.22 m.) apart.

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(1) *Liatris odoratissima* is found in the United States, from the Carolinas to Florida. Its leaves when fresh have but little scent, but when dried they exhale a perfume very like that of the Tonka bean or of vanilla, and are sometimes covered with needle-like crystals of coumarin. Only the leaves near the roots are picked, and are carefully dried.

See DUJARDIN BEAUMETZ et EGASSE, *Les plantes médicinales indigènes et exotiques*, Paris, 1889. (*Ed.*).

The lines should not be closer together, because the plants would not grow so well, and it would be dificult to clear the ground of weeds

Slips are used for planting, and 1800 are sufficient for an acre (40.467 *ares*); the slips cost about 16 s. per hundred. It is not a good plan to propagate the plants by division, although it seems at first sight the easiest way; there is no saving in the long run, as the plants thus obtained are an easy prey to a cryptogamic disease.

All weeds should be cleared, but it must be remembered, that the roots of the lavender often lie very near the surface.

Carrots are often grown on the beds as a catch crop, and this hinders the growth of weeds.

The crops are generally gathered in August and October.

THOMAS. **Cultivation of Japanese Peppermint in Germany.** (Ueber die Kultur der japanischen Pfefferminze in Deutschland. — Deutsche pharmazeutische Gesellschaft. Nov. 10, 1910). — *Zeitschrift für angewandte Chemie*, XXIV J., H. 1; pp. 28-29, Leipzig, Jan 6, 1911. **146**

Germany

Japanese peppermint is characterised by the large quantity of menthol (50-90 %) contained in its essence, and it has therefore been thought advisable to attempt the cultivation of it in Germany. The first crop, obtained in July 1910 from imported plants, was very well grown, and gave 0.087 % of essence, and in August the second crop yielded 0.07 %, very like the Japanese product. The plantation, however, was attacked by a special parasite, *Puccinia Menthae*, Perrs, which caused a decrease in the yield.

A decisive answer cannot yet be given, as to whether this cultivation is advisable in Germany, but in the meantime it might also be tried in the Colonies.

WERNER REINHART. **Production of Sandal-Wood Essence in South Hindustan.** — *Bull. Sem. Schimmel et C^ie^*. Miltitz, near Leipzig, Oct. 1910, p. 114. **147**

British India: Canara Mysore

The extraction of sandal-wood essence has long been an industry in the South of India, especially at Udipi, in Southern Canara, but it has been much on the decline of late. The natives of Udipi go to the Mysore and Coorg markets, and the high price they offer, especially for the Coorg wood, has been often remarked. They do not, however, distil all the wood they buy, but resell some in Bombay. It is affirmed that the distillers also use smuggled wood (sandal-wood is a monopoly of the State of Mysore): it may be also that sandal-wood is grown here and there in India.

This industry is carried on chiefly in the North-East of Karkul, up to the foot of the Ghauts The yield in essence is as follows:

For the Roots	about	4.34 %
» » Jagpokals.	»	3.47 »
» » Ain Chiltas	»	2.60 »

Part of the product that is put on the market comes from Udipi and part from Mangalore; the latter is the most important locality and exported last year, according to local information, essence to the value of 150 000 rupees (352 590 frs.). The essences of Mysore, which pass through Mangalore, were undoubtedly included in these figures.

Nearly all this essence is sent by steamer to Bombay, whence it is exported to the Persian Gulf and China. About 40 fr. per kg is paid now at Mangalore for a pure essence of good quality.

148 Edible Beans from the British East Africa Protectorate. *Bull. Imperial Institute*, Vol. VIII, N. 3. London, 1910.

British East Africa Protectorate

During the last year or two, a great deal of attention has been given by the Department of Agriculture in East Africa to the cultivation of beans for export, and a large number of varieties are being tried experimentally, in order to ascertain which kinds thrive best and can be recommended to planters for cultivation. A series of samples of the beans obtained in these experiments has been recently sent to the Imperial Institute in London for examination and valuation.

The reported results of examination show that these beans are of excellent quality, and consist of varieties likely to meet with a ready sale in the United Kingdom, if they can be produced in quantity.

The samples were submitted to the usual scheme of analysis, and in addition, each variety was tested for the production of prussic acid and for the presence of alkaloids. In no case was any trace of these deleterious constituents found, so that all these varieties of beans may be safely recommended for use as human food, or in the case of the poorer, coloured beans, as food for animals.

The varieties recorded are the following:

Soroko, Black Posho, Ngena, Black Chiroko, Native Food, White Njahe, Red Njahe, Kunde Black, Kunde Red, Maragwe (Kidney-shaped), Maragwe (Medium-sized oval), Maragwe Grey, Dwarf Marvel, White Posho, Canadian Wonder, French Cocos, Rose Cocos, White Capucin, Yellow Haricot and Butter Beans.

In most cases these samples of East African beans agree closely in composition with well-known pulse already on the market in the United Kingdom.

Imports of Italian Tomato Paste into the United States. — *The Canner and Dried Fruit Packer*, p. 38. Chicago, Nov. 10, 1910. 149

Italy

From information secured through some of the best known handlers of Italian tomato paste in New York, it can be stated that imports are decidely on the increase. One importer states that the actual imports last season were in excess of 135 000 cases, of from 200 to 250 grams per tin. The prospects this year are far upwards of 150 000 cases.

The best tomato paste comes from the neighbourhood of Naples, and stock now on the market is sold in wholesale quantities to the Italian retailers at 3.90 dollars per 100 tins, containing 200 grams each. In 250 gram tins, 4.25 dollars per 100 tins is quoted. Sicily tomato paste is cheaper, and sells 2.50 dollars per 100, 200 gram tins. A few years ago, the imports amounted to only about 85 000 cases. This year, is believed, the imports will be in excess of 150 000 cases.

Italian tomato paste, however, is sold almost entirely to Italians. They known what it is and they buy it because it is their home product. The paste is very different from canned tomatoes (American). The product itself is different. The Italian tomato is small and rather sweet; when ripe it is blood red, and it is never picked for paste making until it is dead ripe.

With the growth of the Italian population in the United States, there is bound to be a much greater increase in the use of tomato paste and all other Italian products.

The importations of canned tomato sauce, tomato paste and peeled tomatoes from Italy into the United States amount yearly to about 750 000 dollars.

Chenopodium Amaranticolor. — *La Quinzaine coloniale.* Paris, Dec. 25, 1910, 150

France

Chenopodium amaranticolor is a plant which has a fine future before it as a vegetable. It is a straight-growing, rather shrub-like plant, which sometimes reaches nearly 4 metres in height in hot countries, and, in the environs of Paris, about half that height. It is ornamental, and furnishes a profusion of edible leaves which have a flavour that many prefer to spinach.

Experiments are being made with this plant in Tunis and Tonkin, with the object of making it known to all Colonial farmers. Till now it has been very difficult to get the seeds, but they can now be had in considerable quantities.

151 J. Facry. **Strawberry Cultivation in Vaucluse.** — *Journal d'Agriculture pratique*, No. 49, p. 723. Paris, Dec. 8, 1910.

France

For the last twelve years, the cultivation of strawberries has been spreading in Vaucluse. The fruit is grown in the open, on what were formerly waste lands, worth at the most 250 frs. per hectare, but which, owing to cultivation and irrigation, now fetch 6-7000 frs. per hectare. When starting a strawberry bed, rows of cypress or *thuja* should be planted across in the direction of the prevailing dominant winds (mistral). The strawberry plants should be placed in beds divided by irrigation trenches; and those which have taken root, transplanted at the end of June or the end of September. When the bed is being laid out, it should be well manured with farm manure, manufactured fertilizers being used in following years, as well as oil-cake, chrysalides and a small amount of iron sulphate to avert chlorosis. Mr. Facry advises the use of complete manure formulae. The only further needs of the strawberry bed are hoeing and watering. The plants bear fruit for three years as a rule: the first crop is poor, the second very good, but the third is not so good. The plants must then be renewed,

A considerable number of different varieties have been tried in Vaucluse, but only about a dozen of them were successful. The following are arranged in order of maturity: *Reine des hâtives*, *Milner Héricart de Thury*, *Noble*, *Paxton Souveraine*, *Victoria*.

Strawberry beds produce from 4000 to 10 000 kg. of fruit per hectare, and the price varies from 20 to 300 frs. per 100 kg. The average profit is 1000 frs.

152 J. Vercier. **Notes on some Varieties of Raspberry Bushes Grown for Experiment in the Côte-d'Or (France).** (Notes sur quelques variétés de Framboisier expérimentées en Côte d'Or. — *Progrès agricole et viticole*, N. 52, p. 784. Montpellier, 25 Décembre 1910).

France

Different varieties which yield two crops a year were observed during 6 years, for the purpose of discovering the best.

Those examined are:

Frambroise violette de Plombières (local variety);
Framboise Rose de Plombières (local variety);
Carter's prolific;
Superlative (English);
Superlative (of american origin);
Hornet;
Pilate;
Merveille des quatres saisons rouge;
Logan-berry (of american origin).

The two last varieties were grown merely as curiosities. Amongst the other kinds capable of cultivation for commercial purposes, two should especially be mentioned; *Carter's Prolific* and *Hornet*, both very vigorous and prolific.

The others may be classified in the following order:

Violette de Plombières;
Pilate;
Superlative (English);
Rose de Plombières;
Superlative (French).

Cultivation and Production of Fruit in the State of St. Paul (Brazil). — *Recueil consulaire*, publié par le Ministère des Affaires étrangères du Royaume de Belgique, T. 151, 1e Livr., pp. 26-27. Bruxelles, 1910. 153

Brazil

Bananas for export are mainly produced in the tropical region of Cubatâo, in the maritime district of Santos, of which they are the chief wealth. There are about a million banana trees in this district and the produce is sent to the capital, to other parts of Brazil, and abroad. The total fruit exportation of St. Paul is very considerable, having risen from 803 000 kg. in 1893 to 3 250 000 kg. in 1907.

Tho *abacaxis* (variety of pine apple), which can be kept for a long time, is grown in various parts of the country, at Villa Americana, etc., and the trade in this fruit is very flourishing.

Amongst the other fruits grown here are oranges, tangerines and lemons of all kinds, but these are only for local consumption. Brazil was at one time the chief purveyor of oranges to La Plata, but has been ousted from this branch of the trade by Paraguay and the northern provinces of Argentina. Other fruits grown are the water melon, the jaboticabas (a kind of plum), quinces, melons, mangoes, strawberries, etc.

The Ministry of Agriculture is considering measures for developing the export of fruit by train and steamer in cold storage.

There are some new cacao plantations along the coast; the chocolate manufactories of the State use cacao from Bahia and Central America.

1 500 000 New Fruit Trees. — *Fruit Trade Journal.* New York, 24 Décembre 1910. 154

United States: Oregon

According to the Government horticulturist, 1 500 000 fruit trees will be received and planted in the Roque River Valley this season.

This will be sufficient to cover about 20 000 acres, which will make the total planted area in the valley orchard district 85 000 acres.

The Government horticulturist is compiling a census of fruit trees in the North West fruit region. A complete return is to be made, and the figures will be corrected from year to year.

155 **Fruit in Rhodesia: Citrus and Other Fruits.** — *The Times.* London, Nov. 6, 1910.

Southern Rhodesia has a promising future before it as a fruit-producing country.

Rhodesia

Apples, plums, peaches, pears, grapes, figs, bananas, pineapples, and many other fruits are grown in different parts of the country. Citrus trees and Japanese plums do particularly well, and beginn to bear fruit very early.

Rhodesian oranges are stated by leading experts in London to be equal to the finest Californian fruit, and there is every prospect of a profitable export trade being established. The fruit has been valued by London middlemen at a price which should secure to the grower a satisfactory return, and Rhodesian oranges have the great advantage of being able reach the London market during the summer months, when this class of fruit does not come from other parts of the world.

156 GOETHE AND JUNGE. **The Depth at which Fruit Trees should be Planted.** — *Revue agricole et viticole de la Haute-Marne*, No. 24, pp. 385-386. Chaumont, Décembre 1910.

Germany

Experiments were made from 1896 to 1903 in connection with this question, at the Agricultural Institute of Geisenheim (Germany) with the French cider apple *Frequin.* The trees selected were 35 in number, as nearly alike as possible and of a type with the branches beginning at a fair height.

The trees were divided into seven lots, the first being planted in the ordinary way and used as a control; the others were planted as follows:

2nd Lot;	root-neck	placed	5	cm.	lower than	in control lot.
3rd »	»	»	10	»	»	»
4th	»	»	15		»	»
5th »	»	»	20	»	»	»
6th »	»	»	30	»	»	»
7th »	»	»	40	»	»	»

During the first year of this plantation, 1896, no difference in the vegetation was observed, but in the two following years there was a slight difference, the leaves of the trees that were planted at the greatest depth falling much earlier than those of the control trees.

In 1899, the fourth year, the deeper-planted trees were observed to be decidedly inferior to the others, from the point of view of the formation of the crown, the development of the trunk, and the number and dimensions of the branches.

In 1903 all the trees were pulled up and the circumference of the trunk of each tree was measured. The average circumference of the control trees was 13.4 cm., that of the fourth lot 11.8 cm., of the fifth 10.8 cm., sixth 10.1 cm. and seventh 9.8 cm. It was further remarked that the trees which had been most deeply planted had large cankers.

These experiments, made by Goethe and Junge, show that the development and nutrition of fruit trees are disturbed by their being too deeply planted, the growth of different parts of the tree being arrested in proportion to the depth at which it has been planted, and such trees are more subject to disease.

HENRY D'ANCHALD. **Preventing Frost by warming the Air in Orchards.** — *Journal d'Agriculture pratique*, No. 52. Paris, Dec. 29, 1910. **157**

United States

Experiments have been made in the United States on the protection of crops against late spring frosts, and good results have been obtained by slowly heating the lower strata of air by small and numerous fires.

Petroleum stoves were used in American orchards, and 260 of these stoves, that is, one to every 35 square metres, were found sufficient to raise the temperature of a hectare from 5° to 6° C. Paper sacks stuffed with wood shavings and soaked in petroleum were also used.

The cost of these fires varies from 18 to 24 frs. per hectare, without counting the labour. Excellent results have been obtained by their use in Colorado and New Mexico.

The Vine Nurseries of Carpentras, France. — *Revue Scientifique*. Paris, 3 Décembre 1910. **158**

France: Vaucluse

The district of Carpentras in Vaucluse is occupied by nurseries for the grafting of vines on American plants. From an economic stand-point, the nurseries are most interesting, as they keep all the labourers occupied during the winter months.

The production of 30 000 cuttings costs from 500 to 600 frs., to which must be added the expense of sawdust, moss, boxes, and of coal when the cuttings are placed in layers in the hot chamber, of sand when they are placed in the sun. If to this outlay is added the cost of the manual labour which is necessary at least every week, one realises how much commercial and agricultural activity is required for the annual raising of millions of plants in the Carpentras district.

The majority of the nurserymen have formed themselves into a Company to regulate the trade, burning all valueless plants and repressing fraud, which had taken the form of altering the labels if the variety ordered was sold out.

Affairs have not progressed very well recently on account of a series of bad seasons for vine culture in the Centre and North-East of France.

159 F. CARTIER. **Observations on "Direct Producers," or ungrafted hybrid American Vines, in Savoy.**—*Progrès agricole et viticole*, No. 50, p. 717. Montpellier, Dec. 11, 1910.

France: Savoy

The year 1910 was disastrous in Savoy for the vine; only the hybrid direct producers gave any fruit in Savoy, and the crop of the *Vinifera* was completely destroyed.

This article contains a list of the direct producers which seem most suitable for Savoy, and some observations on the qualities of the different stocks are given.

160 L. PIROVANO. **New Hybrids of Table-Grape Vines.** (Nuovi incroci di viti da tavola).—*Bull. della R. Soc. Toscana d'Orticoltura*, Florence, Vol. XV, No. 10. 1910, pp. 268-272.

Italy: Tuscany

The hybrids described were made exclusively with the best table-grape vines, American vines being excluded. As far as the resistance to phylloxera and cryptogamic diseases is concerned, the hybrids obtained resemble other European vines, but the crossings were invariably invigorated by being produced from seed.

Among the best varieties obtained, the following may be cited:
Chasselas rose × Hamburg Muscat.
Agostenga × Hamburg Muscat.
Scallop-leaved Chasselas × Ferdinand de Lesseps.
Madeleine Royale × Ferdinand de Lesseps, etc., etc.

161 E. T BIOLETTI. **Vine Culture in California.** (Cultivo de la vid en California).—*La Hacienda*, Buffalo N. Y., Dec. 1910, vol. 1, pp. 85-88.—See article No. 342 at page 161.

United States: California

162 R. L. GILBERT. **Australian Grapes for English Markets.**—*Gardener's Chronicle*, Vol. XLVIII, No. 3649, pp. 414-415. London, Dec. 3, 1910.

Australia

Four shipments of grapes were sent to England last spring from Western Australia in cold storage; they totalled over 4000 cases, each case containing 23 lbs. or 10.40 kg. The varieties were *Almeria*, *Flame Tokay* and *Purple Cornichon*. They arrived in perfect condition and fetched prices varying from 14 to 33 shillings per case, or 17.50 to 41.25 frs.

The cost per case, including all charges, was 4s $5^1/_2$d, or 5.56 francs, so that the net return to the growers was highly satisfactory.

This success, added to that of the cold storage experiments carried out at Melbourne, has le the Victorian Government viticultural expert to procure several thousands of cuttings of *Flame Tokay* from Western Australia for propagating at the Victorian Viticultural College.

It is calculated that there are twenty million acres in Western Australia suitable for grape growing; and if only a small part of that area were laid down in vines, the yield in a few years would be sufficient to amply supply the English as well as other European markets.

Record Vegetable and Orange Shipments from Texas. — *American Grocer*, New York, Dec, 7, 1910. **163**

United States: Texas

More fresh vegetables will be sent from Texas to Northern and Eastern markets in the United States during the next four months, than ever before in the history of the State.

Special trains of green produce are being run from points along the Gulf Coast and the lower Rio Grande valley, destined for St. Louis and New Orleans, whence the vegetables are distributed over the country in carload lots. The increase of acreage in various kinds of vegetables is enormous this year.

Large shipments of oranges are now being made from South Texas. This, of itself, is something new for this State, and serves to show what strides agricultural development is making.

The fresh vegetable export season will reach its height during January.

G. Riviere and G. Bailache. **The Influence of the Leaves on the Development and Chemical Composition of the Fruit of the Pear-tree.**— *Journal de la Soc. Nat. d'Horticulture de France*, pp. 678-680. Paris, Nov. 1910. **164**

France

For this experiment there were taken twenty-four fruit-bearing spurs of the pear-tree variety *Directeur Hardy*. From twelve of these all the leaves composing the involucrum were cut off at the base, but on the other twelve they were left. In both series, only a single fruit was kept on each spur. Fruit and leaves were removed simultaneously, on May 25, 1910.

The result was as follows:

1) The fruit obtained from the shoots deprived of leaves since the spring, was lighter in weight than that given by the shoots which had been allowed to keep all their leaves during the period of growth;

2) The fruit obtained from the shoots which had been deprived of their leaves had less sugar in the pulp, when ripe, than those which had been left complete;

3) The fruit of the first series was more acid.

This experiment also showed that the fruit is not nourished solely by the leaves immediately surrounding it, but also by the whole foliage of the tree.

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Forestry.

165 **Forest Clearing and Methods of Tillage by African Natives.** — *The Southern Workman*, p. 683. Hampton, Virginia, Dec. 1910.

Africa: Congo

Where the forests are heavy they are cleared in much the same manner as in many parts of America. The trees are cut down and burned, together with the underbrush. In the more primitive parts of the Congo country, a fresh patch of forest is cleared each year and the old plantation is allowed to revert again to jungle. This, of course, is very wasteful and tends to destroy the magnificent forests. The following is a description of the methods of tillage among the Bongos in the upper Congo country: "Not far from the Bongo villages stretch the plantations. At the cost of enormous labor great clearings are opened in the forest. Everything is beaten down and cut short. Next, fire burns up the leaves and small dry wood. The men do this preliminary work. Then the women and slaves dig up the ground, and roughly cleanse the soil, setting themselves particularly to the task of getting rid of parasitic growths. After this they plant pell-mell and almost at the same time, maize, manioc, bananas, pumpkins, and other vegetables, a reasonable space being left between the plants. The plantations thus produce in succession. crops of maize, vegetables, bananas, and manioc.

The Bongo peoples do not weed their fields, except during the first half of the year, for the crops of maize and vegetables. At the end of five or six months, banana trees and manioc plants struggle against the lianas which grow afresh without ceasing, and they are with difficulty disentangled from time to time.

By this method, the Bongo obtain the maximum of produce and are lavishly rewarded for their toil. They never plant in natural clearings; the soil is not rich enough" (1).

Among the Basuto, when the time for cultivation comes, the neighbours are invited to help; each one comes provided with a hoe.

Each chief has as many fields as he has wives (2).

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(1) Sir H. H. JOHNSTON, *George Grenfell and the Congo*, vol. I, p. 369, London, 1908.

(2) LIVINGSTONE, *Narrative of an Expedition to the Zambesi*, 1858-1864, pp. 122, 123, London, 1866.

J. ROTH. **The Influence of Thinning on the Woody Growth of Forests.** — *Erdészeti Kisérletek* (Forstliche Versuche). Organ der K. Ung. Centralforstversuchsanstalt zu Selmecbànya, Redigiert von Oberforstrat Prof. Eugen Vadas, 1909, H. 1-4 (1-2). *Allgemeine Forst- und Jagd-Zeitung*, 68 J., pp. 433-438, (436-438). Frankfort am Main, Dez. 1910. **166**

Hungary

Remarkable results have been obtained by thinning in the fir and beech woods of the Royal Hungarian Forest Administration of Bröd (North Hungary). From the data given, it appears that even if the thinning is done after a long period of depression, the trees react within 1 or 2 years, to the extent that the thickness of the annual rings is increased in some cases as much as fourteen times.

These interesting results may be seen from the following table:

QUINQUENNIAL PERCENTAGE OF THE MASS OF WOOD SAWN. REGRESSIVE VALUATION SINCE THE FELLING PERIOD (1909).

	Quinquennial Periods.					
Forests	I	II	III	IV	V	VI
Fir of 111 years, thinned at about 103 years	30	6	6	7	7	7
Fir of 134 years, thinned at about 126 years	23	4	6	5	6	8
Fir of 84 years, thinned at about 76 years	52	3	5	5	6	—
Beech of 133 years, thinned at about 125 years . . .	33	3	2	2	2	4

The strongest growth was at the base, rather than at the top of the trunk. The timber obtained during this exceptional growth was naturally not of the best quality.

H. VATER. **Nutritive Requirements of Wooded Land.** (Die Erforschung des Zulangens der Nährstoffe in Waldboden). — *Naturwissenschaftliche Zeitschrift für Forst- und Landwirtschaft*, pp. 570-577, 8 J., 12 H. Dez. 1910. **167**

The following results were obtained from eight experiments made at the Institute of Forest Experiments at Tharandt. The nursery experiments were made partly with pines and partly with spruce.

Germany

a) Experiments on growth in unmanured soils.

The growth in these soils was only from 7 to 48 per cent of that in fully manured soils.

b) When the content of the soil in nutritive substances is only 20 per cent of what should be supplied by complete manuring, it is unsuited for sowing; a content of at least 30 per cent is necessary.

The amount of nutritive substances in the forest soils examined varies from 22 to 100 per cent of what would be necessary for good growth; in pine and spruce plantations it is nitrogen that is generally most deficient.

c) The liming of the soil increases the growth from 0 to 68 per cent compared with the growth on soil that has not been so treated; an increase of growth of 243 per cent was verified in one case.

The ready solubility of lime in soil waters makes it necessary to have abundance of lime in order to obtain a normal growth.

168 N. Sylven. **Types and Varieties of Spruce (*Picea Excelsa*) in Sweden and their Importance in Forestry.** (Studier öfver granens formrikedom, sarskildt dess fogreningstyper och deras skogliga varde). — *Meddelanden fran Statens Skogsforsoksanstalt*, H. 6, 1909, pp. 57-117, + fg. 19, + tab. 26 (201-261). Stockholm, 1910.

Sweden

This article contains the interesting results of a vast plan of investigation in regard to the varieties of spruce in Sweden, conducted within a certain radius in a wood containing different species of conifers, sufficiently isolated, in North-West Westergötland.

A selection was made of 141 mature spruces, of about the same age, so that their growth might be satisfactorily compared. The following characteristics were fixed for each individual:

Botanical characteristics	*Forest characteristics*
Type of ramification	Height of trunk
» leaves	Diameter at height of man's chest
» scales of cone	Growth of radius in last 50 years
Size of cones	Sound and defective timber
Colour of female flowers	Growing in the open or overshadowed.

The writer first confirms the remarkable variety of forms of spruce observed by other writers, even in such a restricted radius as the one under observation. He also confirms the specific racial character of the scales of the cones, already noted by Schröter ("Ueber die Vielgestaltigkeit der Fichte," *Vierteljahresschrift der Naturf. Gesellsch. in Zürich*, 1898, p. 175 and following). This characteristic has no practical importance, in the writer's opinion, as it has no relation to the forest properties of the trees. On the other hand, this character is connected with the type of ramification, acquiring thus indirectly a certain practical importance.

The writer distinguishes five types of ramification:

1st and 2nd type, clear combed and irregular combed;
3rd type, ligulate;
4th type, laminate;
5th, brush type.

In addition to these well defined types, there are intermediate ones. Of the 141 Spruces examined, the writer has classified:

10, or 7.1 per cent of the clear combed type;
50, or 35.4 » » irregular combed type;
19, or 13.5 » » ligulate type;
9, or 6.4 » » laminate type;
53, or 37.6 » » brush type.

The writer then deals with the normal-leaved type, separating 132 out of the 141 studied; and also the bent-leaved type, of which he observed 9 out of 141 spruces. 120 specimens were classified from the point of view of the form of the cone scales:

60 of the *europaeae* variety Teplouchoff
59 *acuminata* » Beck
1 *versus fennicam* variety Regel.

Then come the intermediate forms, and everything seems to indicate that there is no relation between the types of ramification and those of the cone scales.

As to the size of the cone, it generally varies between 7 and 9 cm. in length; only 15 out of 120 specimens were found with cones longer than 10 cm., and only 5 less than 7 cm., the greatest length observed being 14 cm. and the shortest 4.5 cm.

In regard to the colour of the female flower, 117 out of 127 belonged to the *erythrocarpa* Park variety, and 10 to the *chlorocarpa* Park variety. The following data are given for 141 specimens of spruce:

Height	13 to 22 m.
Average height	17.26 »
Diameter at height of man's chest .	23 to 55 cm.
Average diameter at height of man's chest	35.7 »
Average age	80 years

Average growth of 90 specimens in the last 50 years, 106.6 % of the radius at the beginning of the 50 years.

Of 136 spruces 81, or 59.6 % were sound.
» » 55, or 40.4 » defective.

When these determinations are taken in relation with the various types of ramification, the following remarkable results are found for the (pure and irregular combed type:

	Percentage of sound plants	Growth of radius
Pure-combed type	80	126.9
Irregular-combed type.	76	105.6

The practical conclusion of these investigations, therefore, is that the combed-ramification variety of spruce, that is to say. the variety which has the second and upper set of branches hanging in a uniform fashion, is the best type.

169 E. Wibeck. **Retrogression of the Beech in Sweden due to Encroachment of the Spruce.** (Bokskogen inom Ostbo och Västbo harad af Smaland. Ett bidrag till Sveriges skogshistoria). — *Meddelanden från Statens Skogsforsoksanstalt.* H. 6, 1909, pp. 115-240 + fig. 21 + carte 1 (249-34). Stockholm, 1910.

There are three zones where the beech grows in Sweden.

Sweden

1) The most Southern, which borders the Southern limit of the Norway Spruce, where the beech predominates.

2) An intermediate zone, with conifers and birches, where beeches occur in small woods, and in groups or isolated.

3) The most Northern zone, which contains beech woods at great distances apart.

Mr. Wibeck afterwards studies the present and former distribution of the beech on the limits of zones 2 and 3, on an area of 387 km^2 North of the 57th parallel, in the province of Smaland.

These extensive researches lead to the following important conclusion: Formerly (in the xiv-xv centuries) the beech woods in Sweden covered a much larger area than at present. It should be noted that while the total distribution has increased, the maximum extent of habitat has decreased.

This decrease is very important practically and is due to the encroachment of the Norway Spruce, which, comes down from the North, driving out the beech, except from the most favourable and protected spots.

170 Bommer. **The Growth of *Pseudotsuga Douglasii.*** — (IV Kongress des Internationalen Verbandes forstlicher Versuchsanstalten in Brüssel, 1910, Schluss). — *Centralblatt für das Gesammte Forstwesen,* XXXVI J., 12 H. pp. 569 (560-570). Wien. Dec. 1910.

Some experiments have been made in the Ardennes with the *Pseudotsuga Douglasii* as compared with the spruce (*Picea excelsa*) (1).

Belgium

	Pseudotsuga Douglasii	Picea excelsa
Age	25 years	25 years
Height	4 to 16 m.	4 to 14 m.
Average Height	14 m.	8 m.
Mass per 0,2 hectare . .	28.768 m^3	11.498 m^3

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(1) " The *Pseudotsuga Douglasii*, Carr., also called *Douglas Spruce* (*Abies Douglasii* Lindl.) is a tree for the million. It would be difficult to overrate its beauty. It probably grows

These data confirm the great superiority of the *Pseudotsuga Douglasii* with reference also to the quality of the timber. This tree seems particularly well suited to damp climates such as Belgium, for instance. The slower-growing blue Douglas, seems less well adapted to such a climate.

Yield of Robinia Wood in Hungary. — [*Erdeszeti Kisérletek* (*Forstliche Versuche*). *Organ der K. Ung. Centralforstversuchsanstalt zu Selmecbàya.* Redigiert von Oberforstrat Prof. Eugen Vadas, 1909, H. 1-4 (3-4)]. — *Allgemeine Forst- und Jagd-Zeitung*, 68 J., pp. 433-438 (437). Frankfort am Main, Dez. 1910. 171

Hungary

Data collected for 10 years (1890-1900) show that the value of the annual timber yield of the Robinia forests in Hungary has risen to 35 crowns per *joch* (5755 m²). The interest on the capital employed in this enterprise varies between 2 and 3 per cent, occasionally rising to 5.6 per cent, the revenue from the soil being 11 crowns per *joch*.

O. Sperber. **Mahogany in Mexico.** —[*Der Tropenpflanzer*, No. 12. Berlin, Dezember 1910, pp. 655-658. 172

Mexico

In the State of Chiapas, in S. Mexico, there still exist extensive forests which yield mahogany and also considerable quantities of cedar and various other rare woods.

The exploitation of these forests, which is a very lucrative undertaking, is chiefly in the hands of Belgian and British Companies, although recently the United States have tried to get a portion of this trade into their own hands.

To give some idea of the industry, Herr Sperber describes an area of 10 000 hectares of virgin forest which he studied on the spot.

Without taking the mahogany into consideration, the amount of timber for export yielded per hect. is, at least, 300 m.³ i. e. a total of 3 000 000 m.³ for the whole area.

The lowest price which this timber fetches is 10 francs per m³, so that the actual value of the forest is 30 000 000 frs.

It is difficult to estimate the amount of the mahogany.

On the banks alone of the two navigable rivers which flow through the forests, there are 40 000 tons of this wood, worth 250 to 375 fr. per ton.

The initial cost per ton of mahogany can be roughly estimated at 51 frs. distributed as follows:

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faster than any other conifer." C. S. Harrison, *Cyclopedia of American Hoticulture*, in by L. H. Bailey, N. York and London, 1907. [*Ed.*].

Felling and removing	5.00	frs.
Marking and carriage to river . .	22.50	
Making rafts with the trunks . .	1.25	
Floating rafts to harbour . . .	7.50	
Export duty and harbour-dues. .	12.50	
Sundries	2.50	
	51.25	frs.

The transport to New York costs 20.50 frs. per ton, and to European ports 50 frs. The net cost per ton of mahogany delivered at New York is therefore 75 francs, as against 100 francs when consigned to European ports.

The forests also contain many *Chicle* trees, *Achras Sapota*, from which is obtained Chicle gum, the favourite chewing gum in the United States, of which $7^1/_2$ million of francs' worth is imported yearly from Mexico. The net price of this commodity varies from 35 to 37.50 frs. per cwt. (50.7 kg.) while its sale price has never fallen below 125 frs. The annual yield of the above mentioned forest is at least 2400 cwt.

India-rubber trees are also fairly plentiful, especially *Castilloa elastica*, which yields 7 to 8 tons of rubber annually at a net price of 2.50 to 3.12 frs. per pound (gr. 453), while the sale price varies from 5 to 6.25 frs.

The exploitation of the forests is in the hands of contractors, as this is the most practical and economical method of working them.

The Companies advance certain sums to the workers engaged by the contractors, which money is guaranteed by mortgages on the property of the native labourers.

At the end of each month the work done by each labourer is verified, he receives part of the money due to him, while the rest of his wages goes towards paying off the advances already made to him.

By this system the contractors save much money, as few overseers are necessary.

Such a forest yields yearly (1):

8000 tons of mahogany with net profit of . . .	800 000	frs.
2400 cwt. Chicle gum » » » . . .	215 000	
6000 kgr. rubber » » » . . .	35 000	»
Total	1 050 000	»

The capital invested is reckoned at 5 million frs., which, after deducting the cost of the forest and other initial expenses, leaves a reserve capital of 900 000 frs.

The exploitation necessitates about 700 labourers, who are provided by the contractors with board and lodging. The Company only supply such things as the contractors must purchase for their men, and sell them to the former at 10% above net cost.

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(1) The unities of weight given in this table are those used in the trade of these products. [*Ed.*].

The first year, the contractors clear and put under cultivation 150 ha. in order to provide sufficient food and fodder to enable them to tide over a bad season. Cattle-breeding and fodder-growing are the principal industries of the contractors, although the cultivation of tobacco and cacao, and cedar planting are more remunerative. Sugar-cane may also be a paying crop.

The most important point in these undertakings is that the work should be entrusted to persons who not only understand their business, but are also well acquainted with local conditions.

Quebracho Wood in Argentina. — *Bull. Imperial Institute*, Vol. VIII, No. 3. London, 1910. **173**

Argentina: Chaco

The *quebracho* tree is found in the forests of Argentina and Paraguay, and yields a hard tough wood, which is still used, though not so extensively as formerly, for railway sleepers on the Argentina railways. The wood is rich in tannin and is exported in logs or chips for tanning purposes and for the preparation of tannin extracts.

Comparison shows that a railway sleeper of quebracho wood is worth about 3 ½ dollars, whilst the same quantity of wood will furnish tannin to the value of 10 or 12 dollars. Most of the companies engaged in working the wood have therefore turned their chief attention to the tannin industry.

The yield of tannin from quebracho wood varies from 25 to 30 % and there are now a large number of companies in Argentina manufacturing tannin extract for export. The exports of quebracho extract for tanning, in 1908, were 48 161 tons, of which 24 936 tons were exported to the United States, 12 518 tons to the United Kingdom and 4967 tons to Germany. The exploitation of the immense forests of quebracho in the Chaco territory of Argentina proceeds but slowly, owing to the lack of means of communication. The cost of transport by water is also high.

O. L. **The Algaroba (*Prosopis Juliflora*) in Hawaï** (1). — *Journal d'Agriculture Tropicale*, N. 113, pp. 351-352. Paris, Nov. 30, 1910. **174**

Hawaï

This tree is one of the most valuable that has been introduced into the archipelago, where it flourishes at an altitude of between 800 and 1000 feet, and often forms thick forest belts.

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(1) Algaroba is the Spanish name for the fruit of the carob or locust tree (*Ceratonia siliqua*) but the tree dealt with here is of the genus *Prosopis*. The *Algarobia* Bentham, characterised by its fruit, which has a fleshy and pulpy monocarp and hard endocarp, is very similar to the carob. The fruit of the *P. Juliflora* Syn. *Mimosa Juliflora* D. C. is the small algarobe or algarobille. See BARRAL and SAGNIER, *Dict. d'Agriculture*, Paris, 1886. [*Ed.*].

In addition to the Algaroba being one of the best sources of honey, its seeds are invaluable for cattle and poultry, the quantity consumed in this way each year being estimated at 500 000 sacks. It is stated that this food gives a slight taste to milk, which however is not noticeable unless a large proportion be given, and it is in any case diminished when the rations are distributed after milking.

It was been thought that the seeds might be more digestible if they were crushed, but in this case they must first be soaked in water, or special crushers must be used.

They can be kept in perfectly good condition from 6 to 8 months; their market value is between 7.50 and 10 dollars per ton.

175 **The American Christmas-Tree Industry.** — *Journal of the Royal Society of Arts.* London, Nov. 25, 1910.

United States

The United States require annually not less than 4 000 000 Christmas trees, and there is little doubt that the present indiscriminate cropping, every year, of many young firs and pines for Christmas trees has often a bad effect on the future timber supply. If the forests were under proper management, no harm would be done, for the necessary yearly thinning would satisfy even a greater demand for Christmas trees than now exists. The Douglas spruce is undoubtedly the Christmas tree *par excellence* (1). The centre of the Christmas-tree industry lies in the large cities of the Atlantic States.

The farmers get about twopence half penny for trees which bring one shilling in the city. Pines are in great demand for Christmas trees when spruce is not available, or is only to be had at a high price.

Throughout Maryland and Virginia and in Washington, the scrub pine finds its way into many homes, while in Southern Wyoming the lodgepole pine is almost the only species available for Christmas trees.

176 **Cork Production in Algeria.** (Algiers Korkproduktion). — *Neue Deutsche Wein-Zeitung.* N. 89, p. 47, Mainz, 47 Jahrg, Dec. 1, 1910.

Algeria

There are about 1 300 000 hectares of cork-oak woods in the North of Africa, Portugal, Spain, Corsica and Italy. In Algeria alone there are 460 000 hectares, two-thirds of which are State property. The finest forests are in Kabylia, the mountainous region which extends along the coast between Algiers and Philippeville. The greatest production of cork comes from the Department of Constantine, after which come the Departments of Algiers and Oran. The principal markets and ports for exportation for cork are Algiers, Philippeville, Bona, Bugia, Djidelle and Collo.

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(1) *Pinus Douglasii*, Lamb. = *Pseudotsuga Douglasii*, Carr. [*Ed.*].

Method for extracting Turpentine. — *Bull. Sem. Schimmel et Cie*, pp. 131-132. Miltitz, près Leipzig, Oct. 1910. **177**

Mr. De Lapasse, Inspector of Forests to the French Government, in a paper published by the *Journ. Parfum. et Savonn.* 23 (1910), 76, compares the methods used in France and in the United States for the extraction of turpentine. His main object is to show that Mr. Lemaire is wrong in affirming that the new process used in the United States is better than the French method **France**

According to Mr. Lemaire, the so called electrical production of essence of turpentine saves the trees and allows the resinous sap to be extracted from waste which would otherwise be valueless. By this process the resinous wood is directly heated in cast-iron retorts by means of an electric current of 40 volts. The lower part of these retorts is fixed and fitted in a furnace of masonry, the upper part, in which the wood is placed, being moveable and arranged so as to be raised by means of a winch. Each retort can hold about 500 kg. of wood.

During distillation, which lasts twelve hours, the temperature does not at first rise above 170° C., and the product distilled at this temperature is the commercial essence of turpentine. From 170° C. to 375° hydrocarbons at a high boiling point are distilled, as well as tar, and the residue forms a wood charcoal which is solid, and burns well. The following is given as the yield of a ton of wood: 60 litres of essence of turpentine (this represents 90 to 95 per cent of the total quantity of essence contained in the wood), 160 kg. of colophony or resin, 40 litres of heavy oils, 65 kg. of tar and 325 kg. of wood-charcoal. An energy of 90 kilowatt hours, costing 90 centimes per charge, is necessary for each retort.

As will be seen, this method of extracting gives an essence which, at most, can only be called essence of wood-turpentine.

Amongst the information gathered by Mr. De Lapasse, it is interesting to note that the attempt to introduce the Cup-and-gutter-system in America has met with strong opposition on the part of the negro workmen, who refuse to take the trouble necessitated by the French method in place of the simple arrangement of the so-called box process.

The official representatives of the *Consolidated Naval Stores Company* have given their verdict against the maintenance of the old boxing process and recommended the introduction of the Cup-and-gutter. The Executive Committee has made special reference to the various trials made by the Government, which have conclusively shown the superiority of the new method over the old.

178 **Substitutes for Essence of Turpentine.** — *Bull. Sem. Schimmel et Cie*, Miltitz, près Leipzig, Oct., 1910, p 139.

Mr. Skinner, United States Consul General at Hamburg, has published (in the *Oil Paint and Drug Reporter*, 77, 1910, No. 16, p. 28), an article on the extraction in Germany of substitutes for essence of turpentine from crude **Germany** Borneo petroleum. The first experiments in utilising the crude elements of Borneo petroleum instead of American, which is too light, were made 5 years ago by an English company for the purpose of introducing its products on the market. In course of time, German enterprise took up this industry and keen competition has resulted.

Considering the difference in price between the essence and its substitutes (which cost respectively 85 and 32 marks per 100 kilos), and the fact, that the lattter, according to experiments made by M. Eibner (Munich Polytechnic) might be of great use in the manufacture of varnishes, one can understand why the importance of this industry has greatly increased.

Possibly certain American petroleums, as those of Texas and California, could be used for this purpose.

179 **A new Fuel for the Sudan; Utilisation of the "Sudd" of the White Nile for Preparing a Compressed Fuel.** — *Journal of the Royal Society of Arts*. London, 2 Dec. 1910.

It is proposed to use the rank growths of reed locally known as *Sudd*, **Egypt: Sudan** on the upper reaches of the White Nile, for the manufacture of a new fuel. These reeds extend over an estimated area of some 35 000 sq. miles (about 90 000 sq. kil.) and the Government have to use dredgers to keep channels open through the morass.

For some 200 miles it is impossible to secure fuel of any kind, as the river channel has no banks, and the dredgers depend for their coal supply on Khartum. It is now proposed to convert the Sudd itself into briquettes.

The Sudd will be cut close to the water level by a machine carried on a specially constructed boat. It will then be chopped by the same machine and afterwards transferred by means of barges to a station on shore. After drying, the chopped reeds will be put into machines, called disintegrators, by which they will be ground into loose chaff. From the disintegrators the material will pass automatically into briquetting machines, by which it will be compressed into forms similar in shape and cubic capacity to brown coal briquettes.

C. E. DE MELLO GERALDES and B. D'OLIVEIRA FRAGATEIRO. **Rubber in Portuguese Colonies.** Le caoutchouc dans les colonies portuguaises). Brochure in-8°, pp. 137, illustré et avec 2 cartes. Lisbonne, 1910. **180**

Portuguese African Colonies: Angola Guinea

This is a report presented to the International Congress of tropical agriculture in Brussels on the rubber plants found in the Portuguese Colonies in Africa. The process of cultivation, methods of collecting and preparation of the rubber, etc., are given. There are figures of *Raphionacme utilis* (1) and two maps: one showing the geographical distribution of the different kinds of rubber plants *Landolphia Thollon.*, *Landolphia chylorrhyza*, *Landolphia* sp., *Raphionacme utilis* in the province of Angola: and the other map that of useful plants cultivated in Portugese Guinea (*Ficus Vogelii*, *Cacao*, *Manihot*. *Sea Island*, *Landolphia*).

Cultivation of Rubber in the State of Vera Cruz, Mexico. (Ueber Kautschukkultur in Mexico). — *Gummi-Zeitung*, pp. 160-162. Berlin, Nov. 4, 1910. **181**

Mexico: Vera Cruz

Several American Companies are starting the cultivation of rubber on a large scale in the *Tierra caliente* of Vera Cruz. From 1897 up to the present date nearly 50 000 acres of land have been planted with rubber trees. The variety cultivated is the *Castilloa*.

The yield in some of the plantations has not been very high however, and many of the farmers have therefore turned their attention to sugar-cane cultivation. Great damage is done to the rubber plantations by the wind, and it is therefore suggested that the plants should be protected by fruit tree windbreaks. Many plantations have failed owing to the dry and sandy soil which was chosen for them. In 1908, according to official statistics, the total rubber yield of Vera Cruz was 387 417 lbs., but not more than 20 % of this came from the cultivated *Castilloa*.

Rubber Culture in Trinidad. *Dept. of Agriculture, Trinidad. — Special Bulletin* (Annual), pp. 8-9. Port-of-Spain, 1910. **182**

Trinidad

The following numbers of Rubber trees of ages varying from 1 to 20 years are at present growing in Trinidad: *Castilloa* 600 000; *Hevea* 80 000; *Funtumia* 25 000. Each of these species has given good results, especially the *Castilloa*.

Previous to the introduction of the machine patented by Mr. Harry L. Smith of Tobago, the old process of separation of the rubber from *Ca-*

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(1) The name of this Asclepiadacea is not mentioned in the Index Kewensis, nor in its supplements edited up till 1909. [*Ed.*].

stilloa latex by means of washing and creaming was practised, and the results were unsatisfactory. By the aid of this machine dry rubber can be obtained in fifteen minutes, and the discoloration and deterioration of the rubber, which undoubtedly occur if its separation from the latex is delayed, are avoided.

183 W. R. Tromp de Haas. **Influence of Tapping on the Composition of the Latex of Hevea Brasiliensis.** (*Ann. Jard. bot. de Buitenzorg*, 3^e^ Supplément, I, pp. 443-446, 1910). — *Botanisches Centralblatt*. Bd. 114, No. 24. p. 639. Jena, 13 Dezember 1910.

The following conclusions may be drawn:

Java

1) During tapping, the quantity of solid substances in the latex diminishes; there is said to be a difference of more than 30 % between the first and last tappings.

2) During the operation, the proportion of mineral and nitrogenous substances increases.

3) The method of tapping has a certain influence on the composition of the latex (1).

184 **Percentage of Resin in Trinidad Rubber.** — *Department of Agriculture Trinidad Special Bulletin* (Annual). Port of Spain, 1910. p. 8-9.

The percentage of resin in the rubber produced by the trees of Trinidad has been determined at the London Imperial Institute, and at the Trinidad Government Laboratory.

Trinidad

The following are the results of analyses made by Prof. Dunstan.

Localities	Age	Resin %
—	4	64.1
—	$4\frac{1}{2}$	52.6
—	$4\frac{1}{2}$	56.2
—	$4\frac{1}{2}$	49.3
—	6	20.6
Verdant Vale, small trees associated with *Hevea* on the ground of the Botanical Department.	$7\frac{1}{2}$	52.0
	$7\frac{1}{2}$	36.9
—	Above 12	13.8
—	12	8.3
—	from 14 to 16	8.2
Tartuga	17	23.0

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(1) Compare with the *Bulletin of the Bureau of Agricultural Intelligence and of Plant Diseases*, No. 2. December, 1910, p. 200. *Ed.*)

Tartuga	old trees	15.8
Louis d'Or	10	21.7
Monte Cristo	No age given	37.2
Richmond	"	15.6
Richmond	25	6.2

Results of analyses by Mr. Weber:

Age	Resin %
2	42.33
3	35.02
4	26.47
5	18.18
7	11.59
8	7.21

Mr. Weber has deduced from the above figures, that the rubber trees *Castilloa* should not be tapped before attaining their eighth year.

The total results seem to show that *Castilloa* reaches maturity earlier in Panama than in Trinidad or Tobago.

Paraguayan Rubber from the Tree "Mangaicy". — *Journal of the Royal Society of Arts*. London, Nov. 18, 1910. **185**

Paraguay

In 1909, the first attempt was made to produce rubber in Paraguay. In the northern part of the Republic, grows a tree locally known as the *Mangaicy* tree. It is also called the *Mangava*. One authority states that both these names refer to the rubber product of the tree, and that its true name is *Curnpicai* or *Curupicahy*. Efforts are now being made to cultivate india-rubber trees, and a Brazilian species has been chosen, called *Manicoba* which grows rapidly and winters more easily.

The *Mangaicy* yields a milky sap known as *Chiringa*, which is collected by making a series of incisions, one above another, in the bark of the tree. The trees are tapped from October to April, each tree yielding from eight to ten pounds of sap. A tree can be tapped every other year, if conditions for growth are favourable, otherwise it should not be tapped more than once every three years.

Funtumia Rubber from West Africa. — *Bull. of the Imperial Institute*, Vol. VIII, No. 3, London, 1910. **186**

British W. Africa: Gold Coast S. Nigeria

Considerable attention has been devoted recently by the British Agricultural and Forestry Departments in West Africa to the question of the improvement of Funtumia rubber, and several new methods of coagulating the latex have been suggested. One of the simplest processes consists in boiling the diluted latex and then rolling the freshly coagulated rubber into biscuits. Specimens of Funtumia rubber prepared by this method on the Gold Coast and in Southern Nigeria have been examined recently at the Imperial Institute.

The rubber was found to be of very good quality, the dry material containing over 90°/₀ of caoutchouc, whilst the amounts of resin and proteids are satisfactorily low.

Funtumia rubber prepared by drying the biscuits more quickly to avoid discoloration would command prices greatly in excess of those realised by Gold Coast « Lump ».

187 **Funtumia Elastica in W. Africa.** — *Gummi Zeitung.* Berlin, 4 November, 1910.

/. Africa

In contradiction to the statement that the West African plantations of *Funtumia elastica* yield a good crop from their fourth year, an investigation in British West Africa, Kamerun, and S. Nigeria has elicited the following facts:

1) In none of the above colonies where *Funtumia* grows, can a crop be obtained in the fourth year.

2) It is even problematic whether there is any yield the sixth year.

3) Under favourable conditions, there may be a crop the seventh year.

4) It is only in the 8th year, that a good and certain yield can be expected.

188 ***Landolphia* Rubber from the Sudan.** — *Bull. Imperial Institute.* London, 1910, Vol. VIII, No. 3.

Sudan

A small consignment of rubber from Bahr-el-Ghazal was forwarded recently to the Imperial Institute by the Sudan Government for examination and subsequent sale.

The rubber was obtained from the indigenous rubber-vine *Landolphia owariensis* var. *tomentella*, and it had been prepared in biscuits or sheets, as recommended by the Imperial Institute in previous reports. The results of examination recorded show that so far as chemical composition is concerned, the rubber is of very good quality, the two samples containing 92.7 and 93.6 per cent of caoutchouc in the dry material. The amount of proteid is extremely low in both specimens, and it is noteworthy that the percentage of resin is higher in the light rubber than in the dark.

This rubber, with a little more care in preparation should realise prices comparing favourably with those of Eastern plantations.

Euphorbia Tirucalli, a Rubber Plant. (Una valiosa planta de caucho). — *El Hacendado Mexicano*, Mexico, Dec. 1, 1910. 189

East Africa

A German scientist, Dr. Bade, has obtained some good rubber from the *Euphorbia Tirucalli*, two litres of the latex giving a pound of excellent rubber (1). More than 5 lbs of rubber per annum may be obtained from a plant 6 years old. The chemical process used to coagulate the latex, which costs barely 10 centimes per lb, is a secret. The commercial value of the resulting product differs in no respect from other rubbers.

The question now is to get enough plants to form a plantation. Near the rivers of E. Africa there are thickets of this *Euphorbia*, containing between 300 and 400 trees.

An American Syndicate is about to start some plantations for the cultivation of *Euphorbia Tirucalli*.

V. Henry. **Effects of Ultra-Violet Rays on India-rubber.** (Wirkungen der Ultravioletten Strahlen auf den Kautschuk. — (*Le Caoutchouc et la Gutta Percha*, 1910, vol. 7, p. 4371-4376. *Chemiker Zeitung*. Cothen, Nov. 1910, N. 17, p. 563. 190

Germany

These experiments were carried out by means of a mercury lamp in front of which were placed strips of india-rubber 4 centimetres long and and 0.5 to 1 mm. broad.

Raw india-rubber from the plantation, as well as vulcanized and other qualities were submitted to the action of the ultra-violet rays, and it was proved in every case that the non-vulcanized specimens were much the most affected. At the end of 20 hours, the surface of the latter was darker in colour, and upon the application of tension tests, cracks showed themselves. It was ascertained that these changes only take place when the indiarubber is in contact with air, and are due to oxidation processes.

The most refrangible rays are the most active.

Camphor Production and Trade in China. (La production et le commerce du Camphre en Chine). — *Bulletin Sem. Schimmel et Cie*, Miltitz près Leipzig, Oct. 1910, p. 27. 191

Chinese Camphor production and trade are the subject of important communications in the report of the commercial expert of the German Consulate General at Shanghai.

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(1) *E. Tirucalli* Linn. is a small tree, with round stems and smooth branches. A native of Africa, but has become naturalized in some parts of India. See George Watt, Dictionary of the Economic Products of India. London and Calcutta 1890 [*Ed.*]

According to the declarations of the Board of Maritime Customs there have been produced:

In 1907: 27 198 *piculs*, worth 2 168 047 haikouan taels (1).
In 1908: 15 246 *piculs*, worth 1 005 297 » » of which there have been exported directly, or after transhipment at Hong-Kong,
in 1907: 25 798 *piculs*, worth 2 077 475 haikouan taels.
in 1908: 13 072 » 850 135 » »

The figures of 1909 have not been given, but those of the exportation from some ports being known, a further decrease may be foreseen.

The average export prices quoted at the offices of the Maritime Customs are:

for 1907: 80.56 *haikouan taels* per *picul*
» 1908: 65.04 » » »

In 1909, at Shanghai and Kingkiang, the price was 75.23 *haikouan taels* per *picul.*

Judging by this report, there is no accurate information concerning the cultivation of camphor in general, as to the extent of the forests, and on the minimum price at which camphor can be profitably produced.

No mention is made of any systematic afforestations but this is doubtless owing to the very discouraging prices obtained in 1909.

According to travellers, there still exist in the interior vast areas covered with camphor-trees which have hitherto been turned to no account, because the inhabitants do not understand the extraction of camphor.

It may be assumed that with a rise in price in the markets of the world, large quantities of Chinese camphor would appear, which would probably lead to its methodical cultivation and extraction; as has occurred in the case of other Chinese products.

The exportation from Shanghai was increasing in 1910, in comparison with the monthly averages of 1909.

192 J. M. JANSE. **Extraction of Borneo Camphor.** — (*Annales du Jardin botanique de Buitenzorg*, 2^e série, 3^e suppl. 1910, p. 947). Abs. *Bull. Sem. Schimmel et C^ie*. Miltitz près Leipzig, 1910, p. 143.

Borneo Sumatra An exhaustive treatise on the extraction of Borneo camphor, containing also many botanical, geographical and ethnological data.

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(1) The picul is equal to 133¹/₃ lbs. or 60.453 kilograms. The haïkouan, or Customs taël was worth, on an average, 4.15 fr. in 1907, or 39 pence, and 3.40 fr. in 1908. [*Ed.*].

Dryobalanops aromatica, Gaertn. (Dipterocarpaceae), which furnishes the Borneo camphor, is a stately tree growing to a height of 60 metres.

It is found in great quantities in different parts of the islands of Sumatra and Borneo, especially in the neighbourhood of Baros (Sumatra, hence the name Baros camphor is often given to the Borneo product.

This product, which is much sought after by the Chinese, is very expensive, costing more than 220 frcs. per kilogram. It is a curious fact, that the same tree gives at one time only solid camphor, and at another only oil. M. Janse thinks this phenomenon is explained by the circumstance, that certain trees are inhabited by large insect larvae (probably Coleoptera) which bore holes in the wood. The essential oil collects in these holes and, when conditions are favourable, the borneol sublimates from the oil, and is deposited in the cracks of the wood. This would make it clear why the camphor found in the wood of *Dryobalanops aromatica* is almost pure borneol.

From former observations, it would appear that the essential oil of the above tree contained no borneol, but M. van Romburgh detected by experiment the presence, not only of pure borneol, but also of pinene (1).

V. LOMMEL. The Production of Camphor at Amani, German East Africa. — *Bull. Sem. Schimmel et Cie*. Miltitz, près Leipzig, Oct. 1910, pp. 28-30. 193

German East Africa.

In a report on the camphor tree plantations of Amani and the yield of raw material, M. Lommel describes the working of distilleries and quotes the yields obtained by 55 experiments in distilling 100 kg. of raw material. He gives advice on systematic administration and manufacture. In the second part of the article he sums up and criticises works published in other countries, and in the third gives his opinion as to the future of camphor plantations, taking count of the prices of natural and artificial camphor.

The camphor plantations at Amani are partly in the form of hedges, partly trees, and contain 3500 plants of from $3^1/_2$ to $4^1/_2$ years old, and are situated 500, 750 and 1000 metres above sea level.

The prunings from the hedges and young trees were sorted and passed to the distilling apparatus, which contained from 50 to 100 kg. of raw material, according to the degree of fineness to which the leaves and twigs have been reduced.

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(1) For information respecting the camphor-producing Dryobalanops of Baros, see Odoardo Beccari's work. He suggested some years ago the pathological origin of Borneo camphor and thought it was caused by a change in the wood of the Dryobalanops due to the invasion of fungi

ODOARDO BECCARI. *Nelle foreste di Borneo, Viaggi e ricerche di un naturalista.* Firenze, 1902, p. 552, — [*Ed.*]

Modern apparatus for condensing is of no use, because the distilled camphor stops up the refrigerating worm, and it is necessary to replace it by the ancient methods still used in Japan.

The average raw material consisting of leafy branches yields about 1.2 per cent of camphor, including camphor oil. The ratio of solid matter to oil is double or treble according to the degree and duration of the refrigerating process. The oil contains nearly 75 per cent of camphor; and this camphor dissolved in the oil is included in the estimate. The yield in solid camphor is altogether about 1 per cent. In the *young* camphor trees of Amani the greater part of the camphor is obtained from the leaves; the old ones contain a large proportion of camphor in all their parts.

Experiments made in Florida, Ceylon, the Malay States and California, by other writers have given the same results. Mr. Giglioli, in his work, *La canfora italiana*, also describes some similar experiments, the results of which were in accord with those given by Mr. Lommel.

The special merit of Mr. Lommel's experiments consists in the fact that they were conducted on a scale that might have been employed in practical conditions.

Mr. Lommel does not yet give an opinion on the economy of the cultivation and extraction of camphor as it may be practised at Amani.

194 The Production of Gum Tragacanth. — *Journal of the Royal Society of Arts*, Jan. 6, 1910. London.

Turkey in Asia: Cappadocia

Gum Tragacanth is the product of a wild plant growing in the mountainous region of Cappadocia, Asia Minor (1). It is a small bush only growing at an altitude of 4500 to 7500 feet, and is most plentiful on the slopes of Mount Argaeus, 12560 feet high, of the Taurus range near Caesarea. In June the soil is scraped away from the base of the stem of the plant and incisions are made near the root. The sap, which gradually oozes out, hardens into spiral formations. The first exudations are whitish, and these are the most sought for, especially on the American market. As the earth which has been scraped away lies loose near the plant, any rain falling while the gum is forming washes the loose soil upon the exuding sap, and thereby discolours the gum. Caesarea is the principal market for tragacanth gum, but it is mostly transported by camels to Mersina. The gum is employed in the arts and by druggists in the preparation of lozenges and emulsions, to hold the active element in suspension.

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(1) These plants belong to the genus *Astragalus*, of the family of Leguminosae The following species are known: in South-West Persia, *A. adscendens;* in Syria and Asia Minor, *A. gummifer;* in Armenia, *A. microcephalus;* in the Peloponesus, *A. cylleneus;* and there are some others. See ENGLER, *Syllabus der Pflanzenfamilien*, Berlin, 1909. p. 151. [*Ed.*].

Gum Copal in Sierra Leone. (Col. Off. Ann. Ser. No. 648.) — *Journal of the Society of Chemical Industry*, Vol. XXIX. No. 21, p. 1260. London, Nov. 15th, 1910. 195

Sierra Leone

The gum copal industry has remained practically stationary for the past two years. Sierra Leone used to export large quantities of gum copal.

The Government of Sierra Leone have, in various nurseries, half a million seedlings of *Guibourtia copalifera* which will be ready for planting out in 1911. It will, of course, be many years before the seedlings will be gum-producing trees; but efforts are being made to bring the value of the existing gum trees to the knowledge of the native chiefs and headmen, and it is anticipated that such action will have a beneficial effect on the industry.

In the Ronietta District the gum copal trade has considerably revived owing to the adoption of more careful methods in tapping. The natives have been encouraged to make new plantations of trees. The seedlings planted under Government supervision in 1907 are doing well. There is plenty of gum copal of very good quality in Tambakka, north of 9° 30 N. Lat.

L. MATRUCHOT. **On the Cultivation of a new Edible Mushroom, the *Pleurote Corne d'abondance.*** — *C. R. Ac. Sc.* Paris, Dec. 27. 1910, N. 26, pp. 1376-1378. 196

France

The *Pleurotus* are basidiomycetes, fleshy mushrooms growing exclusively on wood, generally on the trunks of living or felled trees. All the species of this genus are edible, and the attempts to cultivate them are therefore of practical as well as theoretic interest.

M. Matruchot gives a detailed description of some experiments made by him, showing that *Pleurotus cornucopioides* may be artificially cultivated. In fact, under certain conditions, the complete development from spore to spore can be obtained.

The Cornucopia *Pleurotus* can also be grown by simply planting discs from the trunk of a tree attacked by this parasite.

The article is illustrated.

LUCIO GABELLI. **Truffles in Connection with Afforestation.** — I tartufi. Loro coltivazione e rapporti col rimboschimento e con la crisi vinicola, Bologna, 1910, p. 31. 197

Italy

While in France the cultivation of the truffle yields 2 536 000 kg., in Italy, where this fungus is not artificially propagated, the annual crop amounts to 100 000 kg. divided as follows: Venetia 10 000 kg.; Lombardy 9 000; Piedmont 27 000; Emilia and Romagna 8 000; Umbria 30 000; The Marches 9 000; Tuscany 2 000; Sardinia and Sicily 5 000.

Prof. Mattirolo gives the following list of edible varieties of Italian truffles, placed in descending order as to value (1).

Tuber magnatum Pico; *Tuber melanosporum* Vitt.; *Tuber mesentericum* Vitt (including *T. bituminatum*); *Tuber macrosporum* Vitt.; *Tuber aestivum* Vitt.; *Tuber brumale* Vitt.; *Tuber Borchii* Vitt.; *Tuber lacunosum* Mattirolo; *Terfezia Leonis* Tul.; *Choiromyces Magnusii* Mattirolo.

Besides these species, many other hypogaean fungi, belonging to the following genera, are eaten in Italy when young: among the Tuberaceae: *Tuber* and *Terfezia*; among the Basidiomycetes, *Rhizopogon*, *Melanogaster*, *Polysaccum*, etc. *Polysaccum pisocarpium* Fr. is a species much prized for the table in Sicily and Calabria, where it grows on the sands of the coast. It also furnishes dyes. One fifth of the Italian truffle crop is exported to France, which has the monoply of this trade.

Under the direction of Prof. Mattirolo, of the University of Turin, experiments in the cultivation of truffles are being carried out in Piedmont, Umbria and Tuscany.

But the culture of truffles cannot prosper in Italy until legislation intervenes to prevent truffle-poaching.

Live stock Breeding.
Aviculture. — Beekeeping. — Silk-Production. — Animal Industries.

198 H. Vincent and Collignon. **Immunisation of Goats against Malta Fever.** — *Compte Rendus hebd. des séances de la Société de Biologie*, N. 34, p. 468. Paris, 2 Dec. 1910.

France

MM. Vincent and Collignon have made experiments in rendering goats immune against Malta fever by inoculating them with an *antigène*. The results give every reason to believe that these animals can be made practically immune from the disease by means of repeated subcutaneous injections of cultures of the microbe which causes it. The cultures should be sterilized by ether which is a volatile antiseptic easily used, and causes no attenuation of the vaccine properties of the virus, which so treated stimulates the production of antitoxins almost as vigorously as the living culture.

This *antigène* is preferable to the living and diluted culture of *Micrococcus melitensis* for inoculating animals; it is also preferable to cultures sterilised by heat.

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(1) Oreste Mattirolo, *Proposte intese a promuovere la coltivazione dei tartufi in Italia.* Annali della R. Accademia di Agricoltura di Torino, vol. LI, 1908.

O. Mattirolo, *I tartufi. Come si coltivano in Francia. Perchè non si coltivano e come si potrebbero coltivare in Italia.* Ibidem, vol. LII, 1909. [*Ed.*]

FRANK TIDSWELL. **The Microbe of Contagious Abortion in Cows. — Vaccination against Abortion.** — *Agricultural Gazette of N. S. W.*, Vol. XXI, Part. 11. pp. 991-1000. Sydney, November, 1910. **199**

Australia
N. S. Wales

The experiments of Bang have shown that cows acquire a certain tolerance to the bacillus of contagious abortion, evidenced at first by retardation of the epoch of abortion for each successive gestation, and ultimately by natural calving.

This shows that cows may become immune to the microbe, and the idea naturally led to attempts to produce this immunity by artificial means, that is by inoculating or vaccination.

Bang made numerous experiments, which led him to believe that cows, ewes, and goats may be rendered immune.

Immunity seems to require the use of living bacilli and in the case of goats seems to be of several years' duration.

The preparation of such a vaccine will be studied by the Government Bureau of Microbiology of New South Wales.

A. STUTZER. **Recent Studies in Animal Physiology and on Cattle Feeding.** (Fortschritte auf dem Gebiete der Agrikulturchemie). — *Chemiker Zeitung*. Cöthen XXXIV Jahrg., No, 134. p. 1192. Oct. 1910. **200**

Germany

Experiments for the purpose of ascertaining the minimum quantity of albuminoids necessary for the nourishment of animals were made by Kamataya on young sheep. and by D. Meyer on fattening pigs.

According to W. Thaer, the amides contained in molasses do not contribute to any assimilation of nitrogen, and asparagin is of slight utility in nutrition.

J. Just thinks that those parts of young grasses, of leguminosae, and of potatoes, which are deficient in albuminoids are of little importance as flesh producers.

A. Morgen. Beger and Westhauser are of the same opinion. They have further proved that extracts of grass and of malt germs cause a considerable increase in the excretion of nitrogenous products, having in certain cases a harmful action. Asparagin as a result of bacterial action, is changed to albuminoid (probably during rumination) and this bacterial albuminoid (as already demonstrated by O. Kellner) can, in certain circumstances, effect an increase in the quantity of nitrogen absorbed and assimilated. The result of these experiments would show that those plant constituents that are deficient in albuminoids have a very varying, and never great, importance in nutrition.

Ammonia salts, as for instance, acetate of ammonium, may, in certain cases be useful to animals, when, for instance, great quantities of carbohydrates and small quantities of albuminoids are given This fact demonstrated some years ago by O. Kellner, is now completely proved by A. Morgen and his collaborators.

For the feeding of animals, salts of ammonia and asparagin are more valuable than other non-albuminoid nitrogenous substances.

It is only in a case of necessity, such as when the food lacks albuminoids, that these constituents are found useful for the preservation of life, and it would seem, also for the formation of milk.

F. Lehmann. O. Kellner and R. Neumann have studied the digestibility of foods, experimenting on pigs (omnivorous animals), instead of on ruminants, as has generally been done.

Hansen, Nils Hanssen and others, have given a favourable opinion on the use of soy-cake for cattle. According to O. Kellner oil-free soy meal contains about 50 % of digestible albuminoids. Its non-nitrogenous constituents, including fibre, are easily digested.

Kleemann has made comparative experiments with pigs fed, respectively, on fish-meal and meat meal. Nils Hanssen has experimented with milch cows, horses and pigs to ascertain the nutritive value of beet « cossettes » prepared according to Stephen's method.

Germany imports yearly 300 million mark's worth (375 000 000 frs) of cattle feeding stuffs. Consequently, it is of national interest to produce feeds which are both sustaining and capable of conservation, as for instance dried potatoes.

Numerous processes of desiccation exist that may be classed under two headings:

Desiccation by gas and steam, and desiccation by the aid of the products of combustion. The former gives better results, but is more expensive.

Potatoes cooked by steam, and especially those called « potato flakes » (*Kartoffelflocken*) are a very good food, not only for ruminants, but for horses and pigs.

Potatoes dried by gas become partially red and are not so easily digested. They are more suited to ruminants, whose intestines are longer, than to horses and pigs.

Dried potatoes can be kept indefinitely without loss, and may be given to animals when fresh potatoes are not available.

201 B. Koch. **Theoretical and Practical Hints in Cattle-Feeding.** (Theoretische und praktische Winke für die Ernährung des Rindes). Hannover, 1910. Verlag von M. und H. Schaped, pp. 1-78.

Germany

This book deals with the organisation of the animal body, the composition of fodders, and the processes of digestion and assimilation. Special attention is given to the different cattle-foods, the nutrition of calves, oxen and bulls, the fattening of cattle, and the preparation and rationing of feeds.

The following are some data concerning the nutrition of milch cows. According to Julius Kuhn, milch cows ought to receive, per 1000 kg. of living weight per day, a ration containing

Dry matter	. . . .	20.0 — 30.0 kg.
Digestible albuminoids	.	1.4 — 2.4
Digestible fat	. . . .	0.4 — 0.7
Non-nitrogenous substances	.	11.0 — 15.0 »

Thus the nutritive ratio of the food given to the animals would vary between 1.5 and 1.8. The same quantity of fodder must not, of course, be given to all milch cows, but must be varied according to the milk production of the animal, the various elements composing the food being always kept within the limits fixed by Kuhn.

According to Schneidewind, the daily ration for milch cows per 1000 kg. of living weight ought to contain the following principles.

Daily Milk Production		Digestible Albuminoids kg	Digestible Fats kg	Digestible non nitrogenous substances + fat × 2.2 + raw fibre kg	Starch value kg
5	litres	1.30	0.3 — 0.4	10 — 10.5	8.5
10	»	1.80	0.5	11.5 — 12.0	10.5
12.5	»	2.00	0.6	12.5 — 13.0	12.0
15	»	2.30	0.7	13.5 — 14.0	13.0
20	»	2.80	0.8	15.5 — 16.0	15.0

The rations for cows no longer giving milk and being fattened for sale should be very rich in albuminoids. From the experiments made by Hansen it appears that their rations should contain per 1000 kg. of living weight, 2.5 to 3.0 kg. of digestible albuminoids and 20 kg. of non-nitrogenous digestible substances. The ration would thus have a starch value of 13.3—14.4.

Much of the food usually given to cattle is rich in carbo-hydrates and, with the exception of hay, deficient in albuminoids and fatty substances. Therefore it is advisable to add to these rations brewery residues, or preferably oil cakes.

The book includes a number of tables giving statistics as to the contents of nutritive substances, the value of the common forages, their digestibility, etc.

202 **Digestion Experiments with Range Forage Crops.** — *U. S. A. Dept. of Agr. Farmers' Bull.*, 420, pp. 9-12. *Experiment Station Work*, LX. Washington, September, 1910.

United States

The Nevada Agricultural Station recently completed some digestion experiments with sheep, in which different species of forage plants of the range were gathered and given separately in the green state.

Many of these succulent plants and shrubs, especially the flowers, are preferred by the sheep to grasses.

The following table gives the results obtained:

DIGESTIBLE MATTER IN 100 POUNDS OF GREEN FORAGE.

Sample	Amount eaten per day	Protein	Fat	Nitrogen free extract	Nutritive ratio
	lbs.	lbs.	lbs.	lbs.	
Indian Potato, (*Atacnia Gairdneri* Hook.) *Umbelliferae*.	[illegible]	3.88	3.73	49.59	1 : 15
Sunflower, *Wyethia mollis*. A. Gray. *Compositae*.	52.56	11.50	2.46	[illegible]	1 : 3.8
Balsam Root or Big Sunflower, *Balsamorhiza sagittata* Nutt. *Compositae*	33.00	12.25	4.06	37.43	[illegible]
Wild Carrot, *Leptotaenia multifida* Nutt. *Umbelliferae*.	50.25	6.88	5.73	50.17	[illegible]
Mountain Indian Pink or Painted Cup, *Castilleia miniata* Dougl, *Scrophularieae*	28.50	6.27	3.47	17.59	[illegible]
Western Brome Grass, *Bromus marginatus*, Stend, *Gramineae*.	24.00	5.91	1.50	[illegible]	1 . 8.5
Native Blue grass, *Poa Sandbergii*, Vasey, *Gramineae*.	15.00	5.15	1.43	[illegible]	[illegible]
Wild Dandelion, *Crepis intermedia*, A Gray, *Compositae*.	34.00	5.11	[illegible]	[illegible]	[illegible]
Bitter Brush, *Kunzia tridentata*, Spreng. *Rosaceae*	8.50	[illegible]	[illegible]	[illegible]	[illegible]
Little Lupine, *Lupinus* sp., *Leguminosae*	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Bitter Vetch, *Lathyrus coriaceus*, *Leguminosae*	14 75	1.47	1.30	39.00	[illegible]

203 VOELTZ. **The Digestibility of Dry Yeast and its Use as a Food for Man and Animals.** (Die Verdaulichkeit der Trockenhefe und ihre Verwendung als Futter- und Nahrungsmittel). (Oktobertagung der Versuchs- und Lehranstalt für Brauerei. (*Tageszeitung für Brauerei*, No. 240-243). Berlin. — *The American Brewer*, Vol. XLIII, pp. 633, New York, Dec. 1910.

Germany

Report on a series of experiments carried out by Dr. Voeltz, in co-operation with Dr. Páchtner and Dr. Baudrexel for the purpose of ascertaining the following points:

1) What percentage of albuminoids and other food principles of yeast is digested?

2) What part of the energy introduced in the form of dry yeast becomes available for the animal organism?

3) What quantity of yeast may animals be fed with?

4) Does the yeast cell contain all the albuminoids and other nitrogenous principles required by the animal organism?

5) Has yeast any value as a condiment?

6) If dry yeast is supplied to live stock in conjunction with another food containing the nutritive non-nitrogenous substances that are lacking in yeast, would this be utilized to the same degree as another food having theoretically the same nutritive composition?

Practical feeding experiments were carried out with horses, sheep, pigs, and rats. The sheep experiments showed that a combined diet of yeast and potatoes resulted in a marked increase in weight, as compared with the gain in weight resulting from cotton cotton-cake rations.

Feeding experiments with pigs gave the following results:

A hog which was being fed with yeast gained 0.7 kg. in weight each day, which must be regarded as a most excellent result. 66°/₀ of the digestible protein were given in the form of yeast.

A sow which had received the same ration of yeast threw ten young after a period of five weeks; the little pigs developed nicely and also received a yeast diet in due time. They doubled in weight in the course of eight days and during their further development kept on gaining weight regularly each week; these results certainly show that yeast is an excellent food for raising young animals.

In other feeding experiments with rats, it was found that the yeast had supplied abundantly all the nitrogenous nutrition needed (yeast being the sole nitrogenous food used).

From his experiments Dr. Voeltz has drawn the conclusion that yeast and dried potatoes combined represent an excellent food for animals. 88°/₀ of the raw protein substances of the yeast were digested; 94 °/₀ of the heat units introduced into the animal body in the form of yeast were capable of being absorbed; the physiological food value of yeast represented 83 °/₀ of the total energy.

When yeast is to be given to live stock it is not necessary to remove the bitter principles, since the animals like the bitter yeast very well. As dried yeast is very bulky, Dr. Voeltz believes that it would be advisable to compress it into cakes, if it is to be shipped any great distance.

Since it has been definitely shown that yeast from which the bitter principles have been extracted is a wholesome food and condiment for man, the physiological department of the Institute intends to conduct a series of experiments on the human subject. In none of the cases on record was yeast found to have laxative properties.

204 A. E. BARTHE. **Spineless Prickly Pear as Forage in the Republic of San Domingo.** (Las cactaceas sin espinas para forraje). — *Revista de Agricultura.* Santo Domingo, Diciembre 1910.

Republic of San Domingo

The Experimental Station in San Domingo is studying the two varieties of cactus: *Anacantha,* originally from Northern Africa, and *Marin* from Mexico; to ascertain their utility for cattle food in a country where forage is scarce.

The *Marin* variety is quite spineless; about 32 hectares of this cactus will feed about 800 head of cattle during six months.

M. Barthe points out the agricultural and industrial importance to San Domingo of the cultivation of these cacti.

205 J. CHAPELLE and J. RUBY. **Olive-Stones for Feeding Cattle.** — *Bull. de la Soc. Centr. d'Agric. d'Hort. et d'Acclim. de Nice et des Alpes Maritimes,* No. 11, pp. 395-398. Nice, Nov. 1910.

France

Olive pomace is rich in nutritive and digestible matter but its nutritive ratio is a wide one (1:13.3), that is to say, it is deficient in nitrogenous substances.

The nutritive substances contained in 100 gr. of olive stones [*grignons*] are:

Albuminoids	4.3	grams
Fats	11.1	»
Carbohydrates.	30.8	»

On leaving the press, the pomace contains a large quantity of hard fragments of shells, the rough edges of which lacerate the digestive organs and cause inflammation. Pigs appear to be the only animals that suffer no inconvenience from this action. An apparatus made by Flaminio Bracci (Director of the Spoleto Experimental Oil-Factory) and by Rossini and Tocchi, serve for separating these hard shell fragments from the olive pomace.

206 J. Ph. WAGNER. **Alteration in Milk caused by Simultaneous Feeding with Green Fodder and Oil-cake.** (Altération du lait par l'alimentation simultanée de fourrage vert et tourteaux). — *Journal d'Agriculture pratique,* No. 50. Paris, 15 Décembre 1910.

France: Isere

In a dairy in Vienne (Isère, France) the milk was found to have a disagreeable taste when green lucerne mixed with meadow-grass (*Poa trivialis*) and sesame cake had been used for feeding. This taste disappeared only when the oil-cake was suppressed. The explanation given was, that the bacteria, which swarmed on the lucerne, produced in the rumen symptoms of putrefaction favoured by the albuminoids contained in the concentrated feed.

The gases expelled from the rumen communicated the disagreeable smell to the milk and to the air of the cow stall. The milk was poor in spores, but contained many bacteria of the *Coli* group.

207 H. BOCK and D. ENGBERDING. **The Employment of Barley, Barley Foods and Maize for Fattening Pigs.** (Ueber die Verwendung von Gerste, Gerstenfuttermitteln und Mais bei der Schweinemästung). — *Fuhling's Landwirtschaftliche Zeitung*, 59 J., 24 H., pp. 841-858. Stuttgart, Dec. 1910.

Germany

Some experiments as to the comparative value of barley, barley residues, and maize in fattening pigs are here described. Two groups of 14 pigs were formed for treatment; they were of the Yorkshire-Ebers breed crossed with the local breed (Mecklenburg-Schwerin), and were 7 months old. The equality of the two groups was secured during a preliminary fattening period by equal feeding.

The experiment, which lasted for 49 days, showed that an increase of 100 kg. live weight was obtained by the following diet:

GROUP I [Maize]		GROUP II (Barley meal for fattening)	
Digestible albumen Kg.	Starch value Kg.	Digestible albumen Kg.	Starch value Kg.
44·57	382.7	52.09	444.1

The percentage of butcher's meat was practically the same:

Group I (maize)	79·7 %
Group II (barley meal for fattening) . . .	80.0 %

All barley residues that are full of chaff are useless for fattening pigs. Consequently barley bran, and usually the pearl-barley residues (sometimes known as "false" barley meal) must be excluded.

What is called in commerce barley meal (*Gerstenfuttermehl*) varies greatly in nutritive value; a large artificial addition of husk spoils it. The husks are often so finely ground as to be scarcely recognisable; therefore it should be most carefully tested.

The *pure* dust of the winter (square) barley, also called "Barley meal" is an excellent fattening food, and, if sold at a reasonable price, is likely to be valued as highly as maize and barley, which are the chief materials for the fattening of pigs.

208 OCKER. **Modern Pig-Fattening in Germany.** (Etwas ueber moderne Schweinmastanstalten). — *Deutsche Landwirtschaftliche Presse.* Berlin, Dec. 10, 1910.

Germany

The poor crop of potatoes in Germany has not this year had any influence on the price or fattening of pigs, numerous establishments having been founded in Germany to replace the small domestic fattening industry. These establishments are particularly numerous in Hanover and Schleswig-Holstein, and the pigs are fed exclusively on barley, fish meal and meat meal.

One of the chief fattening centres, Brinkum, near Bremen, has only 1300 inhabitants and fattens 23 000 pigs. Each building accomodates on an average 300 pigs. When the young ones enter they weigh 50 lbs. (about 25 kg.) and at the end of six months they weigh 250 lbs. They are fed two or three times a day, each animal receiving on an average 5 kg. of barley and 50 gr. of fish meal daily. The floors of the styes are made of brick instead of concrete.

If this industry should flourish in the future as it is doing now, the problem of supplying Germany with meat will be largely solved.

The moderate price of young pigs and of barley, and the high price of pork, make this a very profitable industry.

209 **Feed Grain with Alfalfa Pasturage for Hogs, in Kansas.** *Monthly Press. Bull. Oklahoma State Board of Agric.* Series of 1910. Guthrie, 1910, No. 9, p. 14.

United States: Kansas

Henry Cates, one of the most successful hog raisers of Kansas, claims that hogs on alfalfa pasturage, fed on a small grain ration, will do far better than those fed on full feed of grain in dry lots. Mr. Cates says:

"Twenty-five years of pasturing hog of all ages on alfalfa has proved to me conclusively that a fourth to a hal grain ration while they are on such pasture will produce greater growth per day than when they are kept in dry lots and fed on full rations of corn. Hogs will maintain a reasonable growth, but not fatten enough for market on alfalfa pasture alone, therefore it is best to feed them with some grain while running on green alfalfa in order to make them profitable.

"If it is desired to full feed hogs they will make a rapid fattening growth from increasing the grain ration while they are on the pasture, and with this grain and alfalfa combination, the meat will be nearly as firm as that of the hogs kept in the dry lot and fed on nothing but grain. I find no distinction on the market between alfalfa fed swine and those purely grain fed and they sell price and price alike. The general health of the alfalfa fed hog is equal to that of those maintained on any other feed and they are prolific."

E. Bosch. **The Hair Vertices on Domestic Animals.** (Untersuchungen uber die Ursache der Haarwirbelbildung bei den Haustieren mit besonderer Berücksichtigung des Gesichtswirbels und dessen praktische Bedeutung fur die Beurteilung, Leistung und Zucht der Haustiere). — *Jahrbuch fur wissenschaftliche und praktische Tierzucht.* V. J., pp. 94-125, Hanover 1910. **210**

Belgium

These are critical considerations and original investigations on the subject of the formation of the vertices of hair on domestic animals (especially those which occur on the face) and their practical importance from the point of view of the determination of quality, capabilities, and breeding.

The following are the main conclusions reached:

1) The hair vertices on the bodies of domestic animals have for a long time, and by many peoples, been considered as a characteristic which serves for the determination of the quality of the animal.

2) Recently, even in the most civilised countries, these hair vertices have been thought to have a very close relation to milk production and capability of hereditary transmission.

3) The vertices may take various forms: *vertices simplices et contorti*, *flumina*, *rimae*, *limes*, *cruces* and *pennae pilorum*.

4) Amongst male animals, at the beginning of puberty, the formation of vertices is hidden by the new hair, which is different from that of their immature period.

5) The cause of the formation of vertices is the indirect action of muscular tension (where it is strongest) on the epidermis.

Where two tensions meet, one or several points (*vertices*) or a line (*rima*) are formed following the line of tension.

6) The hair is imbedded more deeply in the bare centre of the vertex than in the part surrounding it; it forms earlier also in the foetus of healthy animals of a good breed; the papillae are thickly nerved and thus form a sort of tactile hair.

7) The question therefore is one of acquired hereditary characteristics. The tension exercised by the muscles of each animal is gradually exerted on the epidermis, causing the characteristics proper to each species.

8) The formation of a fine and clear hair vertex is the sign of a nervous animal with a fiery and sanguine temperament and of a good breed.

9) The vertical position of the vertices of the face indicates: when they are high up, that the animal moves its ears very much, and when low down, that it more often moves its mouth. An unequal position outside the straight line of the head indicates an unequal functioning or incomplete formation of the muscles, which are more powerful when the vertex is low down.

10. The complete absence of vertices in cattle indicates, in addition to

a lymphatic temperament, an excessive functioning of the mouth, and in this case, when the skin is thick, the animal is generally a large eater, whereas when the skin is fine, it indicates defective hearing.

11. It will be seen from all this, that Sasse's theory, which sees a relation between the position of vertices and the milk-producing function, can only be true under certain conditions.

Müller's theory, which makes the formation of the vertices depend on the power of transmission of hereditary qualities is, on the contrary, fully justified; there is no doubt that this is related to nervous and muscular action, which fact is expressed by formation of hair vertices.

211 LIMAGE. **The Improvement of Cattle in the Limon District in Belgium.**— *Revue générale agronomique*, No. 9, Bruxelles, 1910.

Belgium

Success in improving the breed of Belgian cattle is chiefly due to the Herd-book Associations which have laboured to develop the qualities and aptitudes of cattle and to breed them with coats of a uniform black colour, the so-called *poil-bleu*. A type has now to be selected, i. e. an animal which combines the greatest number of desirable qualities, and is best suited to the economic requirements of the district.

It is only by federating the several breeders' associations that a uniform type adapted to the needs of the country can be bred; such a federation would allow of the formation of a central herd-book for all the cattle of Limon.

Later on, when the pedigrees have been well established, cattle shows and competitions will be held exclusively for pedigree stock, the offspring of parents registered in the books of the Federation.

212 **Aberdeen-Angus Cattle for Canada.**—*The Farmer and Stockbreeder*. London, Nov. 7, 1910, p. 2023.

Great Britain. Canada

One of the largest consignments of Aberdeen-Angus cattle that has left England, since the boom days of the eighties, was shipped last week to Canada from Glasgow. The cattle numbered ninety head, and consisted for the most part of calf heifers and young cows, forming part of an order from a cattle owner of Queenstown, Ontario, who is collecting a very large herd of the breed in that province.

213 W. H. MORELAND and E. W. OLIVER. **Notes on the Improvement of Cattle in the United Provinces of India.**—*Deptm. of Land Records and Agric., United Provinces of Agra and Oudh*, Bull. No. 25, p. 3. Allahabad, 1910.

British India

In the United Provinces of Agra and Oudh the cows are ordinarily a miscellaneous lot, and it is impossible to say beforehand that any particular type of bull will suit the cows of a given locality. The breeds suited to some part or other of the provinces are Kheri, Pilibhit, Kenwaria, Mewat (Kosi), Hansi (Hariana), Montgomery.

Kheri breeds. — These are most suitable for Oudh and perhaps as far east as Benares and Gorakhpur. They are excellent workers, and not fastidious in their food; but they are relatively poor milkers, and give some trouble in breaking in to work. The Kherigarh, Parehar and Manjra Singhai strains are the best.

Pilibhit. — Excellent breed of small cattle, good workers, but not distinguished as milkers.

The *Kenwaria* strain is the most suitable for the greater part of Bundelkhand. These cattle are good workers but poor milkers.

Mewat (*Kosi*). — This breed is apparently best suited to the Agra division. The cattle are of medium size, good workers and give more milk than most of the cows found in the province. They require usually more careful feeding than is possible in south Oudh.

Hansi (*Hariana*). — These cattle are most suited to the districts of the Meerut division. They are large and costly animals, and require careful feeding; they are good workers and also good milkers.

Montgomery. — This Punjab breed is an excellent milk-yielding breed.

CADMAN. **Improvement of Farm Animals in Egypt.**— *Diplomatic and Consular Reports*, No. 4554. London, 1910. 214

Egypt

Cattle plague has greatly diminished in consequence of the restrictive measures applied to infected animals, but there is still much to be done for the improvement of all breeds of cattle in Egypt.

The *Khedival Agricultural Society* is trying to bring about an improvement by organising shows of high class animals in various localities. Great attention should be paid to the importation of carefully chosen stud animals.

As far as horses are concerned, the swiftest are nearly always of English blood.

DERWA. **Raising Heavy Draught Horses of the Belgian Breed.** - *Revue Générale Agronomique*, No. 10. Bruxelles, 5^{me} Année, 1910. 215

Belgium

In order to improve the Belgian breed of horses, the first thing to be done is to interest farmers in horse breeding. The State and the Provincial Governments offer pecuniary encouragement in the form of competition prizes to the amount of 315 000 fr. yearly, and the Agricultural Associations subsidised by the public authorities organise numerous local competitions for stud horses in the various districts.

The State further gives a subsidy to the National and to the Provincial

Federations of Mutual Life Assurance for the insurance of stud stallions, and draught horses respectively.

The improvement of the Belgian breed of horses must be brought about by *selection.* In-and-in breeding has given good results.

Belgian horses need to be well fed and exercised in the open air, and also given the requisite hygienic attention.

In order that breeders may become interested in the question, it is necessary to extend the courses and public lectures on the points of the draught horse, its breeding, and diet.

The public authorities should increase the pecuniary encouragement of horse breeding, assist the Associations which concern themselves with this branch, and also organise shows.

216 F. Schötter. **Growth Measurements of Horses.** (Wachstumsmessungen an Pferden). — *Jahrbuch für Wissenschaftliche und praktische Tierzucht.* V. J, pp. 1-41. Hanover, 1910.

Germany

A series of comparative measurements made by Mr. Schötter show that:

1) The size of the metacarpus in Hanoverian colts was as follows, according to age:

a) 6 months	15.71	cm.
b) 1 year	16.63	
c) 1 $^1/_2$ years	18.53	»
d) 14 to 15 months among exhibition animals.	18.7	
26 to 27 » » » »	19.7	»
e) adults	19.0	»

2) The metacarpus of colts from 6 months to 1 year increased on an average 1.08 cm. if the colts were fed in the stable, and 1.8 cm. when the animal had from 6 $^1/_2$ to 7 months' grazing. From the 14th to the 27th month, the metacarpus of show animals increased at the rate of 0.9 cm.

3) When the feeding of the animal was excessive, the development of the bones ceased at 2 years.

4) In this case, there was often a decrease in the size of the bone at the third year.

5) The bones of the forelegs were somewhat unequal in size in a fourth part of the horses, the difference generally being in favour of the right leg.

6) Among colts of from 6 months to one year, the average increase of the thorax was 11 cm., and that in the height of the withers 8.47 cm. After 6 or 7 months' longer grazing, the increase of the thorax was 20.27 cm., and of the height 9.91 cm.

7) Among the factors of development, the kind food must be considered as of primary importance.

8) The length of the metacarpus and the legs increases to a very noticeable extent with the growth of the animal.

C. J. Bailey. The Cost of Horse Power. — *Farmer's Advocate.* London, Ontario, Dec. 22, 1910. 217

Canada: Ontario

The following figures are given on the cost of horse power for draught horses, which weigh from twelve to fourteen hundred pounds, and are worth about $220 at five years of age, the age at which they are most valuable.

During the five months (150 days) that the horse is on full work, he consumes:

3040 lbs.	hay	at $10.50 per ton	. . .	$15.96
1520 »	oats	» 24.00 » »	. . .	» 18.24
456 »	bran	» 20.00 »	. . .	» 4.56
152 »	oil cake	» 37.00 » »	. . .	2.81

During four months in stable:

2440 lbs.	hay	at $10.50 per ton	. . .	$12.81
732 »	oats	24.00 » »	. . .	8.78
366 »	bran	20.00 » »	. . .	» 3.66
During 3 months on pasture at $2 a month			. .	» 6.00
			Total	$72.82

This annual outlay for food is equivalent to an average of 20 cents per day.

The following outlay must also be reckoned against the horse:

Depreciation and interest	$18.00
Stabling per year	8.21
Straw for bedding	5.00
Feeding and watering, cleaning stables, grooming and harnessing.	14.68
Harness	5.31
Shoeing	8.30
Total	59.50
Adding the feeding cost	72.82
Grand Total	$132.32

Against this amount there is the manure, which would be worth $15 per annum leaving $118 a year, or 32 cents a day, against the horse.

218 **Importation and Cross-Breeding of British Cattle in Roumania.** (Vitele Englezesti). — *Journalul Societatii centrale agricole*, p. 608. Bucaresti, Nov. 22, 1910.

Romania

A large farm has been started near Marculesti, in Romania, by an Anglo-Romanian Company, for the raising and cross-breeding of English cattle for the butcher and for dairy purposes. The first importation comprised 10 bulls and 52 cows, the breeds being divided as follows:

Jersey	breed . .	1	bull	6	cows
Hereford		. .	2	»	11	
Aberdeen Angus	»	. .	2	»	10	»
Shorthorn (Durham)	»	. .	5	»	25	»

The farm has now 100 head of pure bred cattle. Excellent results are likely to accrue to cattle improvement in Romania from this venture, because all the cattle raisers in the country are now interested in crossing their stocks with English breeds.

World's Champion Milker. — *The Tropical Agriculturist.* Colombo, December, 1910.

United States: New York, Wisconsin

In Chenango County, New York State, it is claimed that the best cow the world has ever known has been produced. The name of this cow is De Kol Queen la Polka II. She is of the Holstein breed.

The record made by this cow is as follows:

Butter record.	Seven days	35.34	lbs.
»	Thirty days	145.10	»
Milk	One day	124	
»	Eight days	841.8	»
	Thirty days	3376.9	»

The cow that has tested nearest De Kol Queen la Polka II. is Colouth IV's Johanna, owned by Mr. Gillet of Wisconsin. Her record is as follows:

Butter record.	Seven days	=	35.22	lbs.
» »	Thirty days	=	138.54	»
» »	One year	=	1248.00	»
Milk »	Thirty days	=	2677.5	»

Mr. Gillet was offered for this cow and her bull calf, the sum of £3000 (75 000 frs.), but the offer was refused.

CARROLL D. MURPHY. **The Cattalo, a Cross between the Buffalo and the Cow.** — *Farm and Ranch*, Vol. 29, No. 49. Dallas, Texas, December 3, 1910. 220

United States: Texas

A Texas cattle-breeder, Col. Goodnight, has succeeded, after much difficulty, in establishing a new type, which he calls the Cattalo.

He began by a cross between his young buffalo bulls and the Polled Angus cows, a fierce and extremely hardy race, coming from the Scottish Highlands. From this cross-breeding no male was produced, and the half-buffalo cows, by crossing with the buffalo, constantly produced sterile males. The problem thus presented was solved by breeding cattalo females back to black cattle until the buffalo blood in the male was reduced to less than one quarter and the animal became fertile.

Then through the cattalo cows, this percentage of buffalo blood was again bred up to approach the desired type.

After twenty-five years' patient work Col. Goodnight has now a herd of ninety cattalo, and he believes that this hybrid combines the buffalo and Polled Angus bloods in ideal proportion, uniting the resistance and sobriety of the buffalo to the meat-producing qualities of the polled Angus.

Sheep in New Zealand. — *The Farmer and Stockbreeder and Chamber of Agriculture Journal*, p. 2158. London, Nov. 1910. 221

New Zealand

The annual agricultural statistics of New Zealand up to April 30th, 1910, offer considerable interest to breeders of long-fleeced, white-faced sheep. The following table shows the place taken by the respective breeds referred to, and serves also to show that, in spite of the preference of the English market for the black faced South-Down sheep, the long-fleeced animals are the most sought after in New Zealand, at any rate by sheep farmers. The following table gives the number of each of the respective breeds of sheep.

BREED	Number	Proportion % of total
Kent or Romney Marsh	237 120	33.54
Lincoln Longwool. . . . , . .	111 707	15.80
English Leicester . , ...	105 458	14.01
Border Leicester	101 098	14.42
Merino.	50 201	7.10
Shropshire	31 507	4.47
Southdown	26 670	3.78
Various breeds	42 082	5.98
	706 733	—

The total number of animals in all the herds together has risen to 24 269 620, that is, an increase of 788 913 on the preceding year.

222 **Sheep in the Falkland Islands.** *The Farmer and Stockbreeder*, p. 28, London, 2 Jan 1911.

Falkland Islands

Sheep farming is the first and most important industry in the Falkland Isles. The total number of sheep in the islands is 724 736 and these belong to thirty-eight owners of large sheep runs.

Sheep scab has now been practically eliminated. The main industry of the islands has been the production of wool. The establishment of two meat companies, one at Port Darwin and the other at San Carlos, has increased the productiveness of the islands, and frozen mutton will doubtless soon be exported, so that one may look forward to an era of prosperity for the inhabitants of these small islands. Those who are connected with the industry of breeding Romney Marsh sheep can look forward to an increased demand.

223 **Improvement and Cross-Breeding of Pigs in Romania.** (Cresterea porcilor in Romania). — *Agricolturiul* p. 183. Cernaut. Dec. 15, 1910.

Romania

The Department of Agriculture of Roumania has bought 500 boars, 100 being of Yorkshire breed, and 400 of the Servian breed *Mangalicza* (1).

These 500 boars are to be distributed free to farmers, with the object of improving the native breeds, expecially from the point of view of fattening, and thus facilitating the exportation of pork into Austria.

224 **Age of Sows and Breeding.** — *The Farmer and Stockbreeder*. London, December 19, 1910.

United States: Iowa

An investigation at the Iowa Experiment Station to discover the influence of the age of sows upon their fertility and the weight and growth of the pigs they produced, gave some interesting results. It was found, that fifteen sows, aged eight or nine months, averaged seven and two-third pigs per litter, while fourteen sows about twenty-four months old averaged nine and six-tenths pigs per litter, and old sows averaged ten and six-tenths per litter. Pigs from the younger sows weighed on an average 2.39 lb. per pig, from the two-year-old sows 2.63 lb. and from the old sows 2.6 lb. When about six weeks old, the pigs from the young sows made an average daily gain of 32 lb. while the pigs from the two-year-old sows gained 40 lb.

It was found that the two-year-old sows farrowed 24 per cent, more pigs than the young sows, while the old sows farrowed 30 per cent more. The weight of the pigs from the two-year-old sows was 9 per cent greater than that of the young sows, while the pigs from the old sows were 12 per cent larger than from the young sows.

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(1) As a matter of fact this is a Hungarian breed. (*Ed.*).

The pigs from the two-year-old sows made a more rapid gain than those from the young sows, amounting to 26 per cent. In each instance the older sows farrowed more pigs per litter, heavier pigs at birth, and their pigs made the most rapid growth after birth.

HESDÖRFFER. **The "Komondor" Shepherd Dogs.** (Ungarische Wolfshunde "Komondors"). — *Deutsche Landw. Presse.* Berlin, Dec. 14, 1910. 225

Hungary

In addition to the two well known breeds of shepherd dog in Austria-Hungary, the Istrian and Dalmatian, the Hungarian breed, *Komondor*, is also well appreciated. These dogs are vigorous, supple and hardy, white in colour, and well known for intelligence and fidelity, as well as for ferocity, being perhaps the best defence against wolves.

This breed has been particularly appreciated at the German shows, and is to be introduced into Germany, as the best for sheep and farm dogs.

The Swiss Dairying Industry. — *Journal of the Royal Society of Arts.* London, Nov. 18, 1910. 226

Switzerland

There are 2100 dairies in Switzerland, employing on an average four persons each, making a total of 8400 people. Of these, about 1400 are engaged on the production of Emmenthal cheese, a brand which accounts for most of the cheese exports. This calculation does not include a considerable number of people who are engaged in the Alps, where attendants and animals remain for several months in the year. The value of Swiss cheese exports for 1909 was £2 433 000 (60 825 000 frs.) and the price was higher than in 1908.

Notwithstanding the increase in the volume of the exports and the advance in price, the Swiss manufacturers complain of small profits on the year's business, claiming that it is only thanks to the superior quality of their products that they are able to compete in the foreign markets.

P. BERGÈS. **The Present State of the Milk Trade in South America.**— *L'Industrie laitière*, No. 52, p. 843. Paris, 25 Dec. 1910. 227

South America: Chile. Brazil. Argentina. Urouguay.

Although the quantity of cattle bred in South America is considerable, the milk trade is still very undeveloped.

Chile. — Chile was the first nation of South America to take up this industry. Since 1860 it has progressed continuously, owing to the increased consumption in the country itself and the exports to Peru. In 1884 Chile exported 465 650 kg. butter and 201 730 kg. cheese, and now special factories of condensed milk, sterilised milk and milk powder have been set up. The Chile market is overstocked with dairy products; and as the export is limited to the Pacific ports, the supply greatly exceeds the consumption.

Argentina.—Here the dairy industry is more advanced. Although Chile holds the first place in cheese manufacture, Argentina is not at all behind in other dairy produce. The exportation of Argentine butter and cheese began in 1894.

In 1903, 5 330 000 kg. butter were exported, but the increase in duty has led to a crisis, and the cheese export decreases every year. On the other hand the export of caseine, of sterilised milk, condensed milk and milk powder constantly increases, the products being sent to Great Britain, France, Germany, the United States, Brazil and Uruguay.

Brazil.—The dairy produce of Brazil is not sufficient for its own consumption, and two to three million kg. of butter are annually imported; the same may be said of cheese. Doctor Sà Fortes founded the milk trade in Brazil. His dairy deals with 2 million litres of milk yearly and manufactures 6000 kg. butter per month.

He was the first to freeze milk so as to preserve it during transport: Partial freezing is now employed, as suggested by M. Casse, civil Engineer; it consists in freezing into blocks of 10 to 15 kg. the fourth part of the milk intended for transport.

These blocks are then placed in receptacles which are filled up with unfrozen milk. Milk so treated will keep from 15 to 20 days without deterioration.

Uruguay. — The trade in Uruguay is not sufficient to supply the demand of the local market. The most important dairies are those of Breuss y Frey, department of Colonia, which deal daily with 15 000 litres of milk, and the "Carolina" in the department of Maldonado, where four to five thousand litres are used per day. There is in Montevideo a limited liability cooperative company, the "Union Uruguaya" which is beginning to work regularly.

The other Latin countries of America, Paraguay, Bolivia, Peru, Ecuador, Venezuela, the Republics of Central America and Mexico are not included among the nations exporting butter to the international market.

228 **Ranching and Dairy Farming in Rhodesia.** — *The Times*, 5 Nov. 1910, London.

Rhodesia

Cattle thrive and are remarkably prolific throughout the territory of Rhodesia. The Liebig's Extract of Meat Company recently purchased very large areas running into hundreds of square miles of ranching land in Southern Rhodesia.

Dairies have been started at the Land Settlement Farms in the Umtali District and at Marandellas (near Salisbury) to which farmers can send their milk or cream. It is also hoped that cheese making may be started at these farms.

Splendid prices are realized for fowls and eggs.

Commercial Definition of Milk. — *L'Industrie laitière*, n. 49, p. 790. Paris, Dec. 4, 1910. **229**

The French Association for encouraging the milk trade has formulated the following commercial definition of milk:

France

Milk is the integral product of complete and uninterrupted milking of healthy, well-fed, and not over worked milch-cows. Cleanliness is obligatory, and there must be no colostrum.

The following processes are held to be legitimate:

Filtering, chilling, pasteurising, the mixture of pure milk obtained from different cows.

The following processes are optional but should be mentioned to the purchaser: Homogenisation (*homogénéisation*), sterilising by physical means, and partial or total skimming.

The following processes should be forbidden: The mixture of rich milk with skimmed milk (*petit lait*); the addition of antiseptic and other foreign ingredients.

Ch. Brioux. **Fat-Content of the Milk of Normandy Cows.** — *Annales des Falsifications*, No. 25, pp. 473-476. Paris, Nov. 1910. **230**

France: Normandy

The object of the Cattle-raising and Milk-Control Society of the Caux district of Normandy, is the rational and scientific selection of the Caux variety of the Normandy breed, the selection being made both with regard to the good shape of the animals and their milk and butter-yielding qualities, which may be transmitted by heredity. Cows passed by the Society, as having these good points, are examined once a month during 24 hours, and kept under observation during the 10 months of lactation.

The following table gives the average daily milk production for each month of the year 1909, as well as the proportion of fat in the milk. The figures refer to the average milk of 150 cows:

COWS MILKED 3 TIMES DAILY.

Year 1909 Month	Average production per cow				Fatty substances per litre			
					Hours of milking			Milk of 24 hours gr.
	Morn. litres	Midday litres	Even'g litres	Per 24 hours litres	Morn. gr.	Midday gr.	Even'g gr.	
January	7.75	3.95	3.85	15.55	35.5	51.6	45.5	41.1
February	7.44	4.14	4.15	15.73	31.5	47.6	41.4	38.4
March	7.06	3.89	4.15	15.10	30.2	48.7	41.3	38.0
April	6.98	3.99	4.32	15.29	31.9	47.3	41.1	38.5
May	7.14	4.30	4.77	16.21	31.3	44.7	38.2	36.9
June	6.66	3.87	4.46	14.99	31.5	46.4	39.1	37.6
July	6.20	3.59	4.14	13.93	31.6	46.2	40.1	37.9
August	5.89	3.31	3.98	13 18	32.6	45.0	40.3	38.0
September	5.81	3.27	3.45	12.53	33.5	49.5	43.6	40.5
October	5.27	2.95	3.22	11.44	35.1	51.2	45.4	42.1
November	5.35	3.08	3.12	11.55	36.2	52.3	45.7	43.1
December	5.00	2.69	2.70	10.39	36-8	50.7	47.8	43.4
Annual average . . .	6.22	3.54	3.90	13.66	32.7	47.7	41.5	39.1

The growing decrease in the average richness of the milk from January to June, and its progressive increase from June to December are due to two causes: the cows calve, as a rule, during the first month of the year, and the food becomes more watery and more abundant after the fresh grass has grown; the maximum production of milk is therefore in April and May, and the almost fixed quantity of fatty substances secreted by any one particular cow daily, is diluted in the largest quantity of milk. The average richness in fat is lowest in May.

An examination of the above table will also clearly show the striking difference between the average richness of the morning, midday and evening milkings, the difference between the morning and midday milkings being no less than 15 gr. per litre in the annual averages.

Towards the end of the lactation period, many cows are milked only twice a day, in the morning and evening, and in this case the average volume of each milking is nearly identical, and the variations in richness are very slight; the milk is less abundant and more charged with fatty substances.

During the first four months of lactation the milk furnished every 24 hours is of maximum weight, and varies but little; after this it decreases gradually, the average richness increasing at the same time.

Causes of Variation in the Fat-Content of Milk. (Ursachen der Schwankungen im Fettgehalt der Milch). — *Landw. Maschinen u. Gerate*, No. 25. Artern, Dec. 3, 1910. 231

Germany

There are several causes of variation in the fat-percentage of milk, among them being the duration of the lactation period, the fact as to whether the cow works or rests, the nature of the fodder, the way in which the milking is done, etc.

Experiments have shown that a cow milked by a good and practised milker gives milk containing 4-5 % of fat, while the same cow, badly milked, will yield only 2.10 % of fat, Other experiments described in this article, also prove that the manner of milking has very large influence on the fat-content.

SCHUMANN-HINRICHSHOF. **How to Obtain Pure Milk.** (Ein neues, praktisches Verfahren zur Gewinnung von Vorzugsmilch). — *Milch Zeitung*, pp. 2-4, No. 1. Leipzig, 7 Jan. 1911. 232

Germany

This is a study of the methods followed to obtain a sterilised milk, or milk poor in germs, without having recourse to intense refrigeration or to pasteurisation.

The conclusion reached is that the methods hitherto employed for obtaining pure milk are either too costly or are unpractical.

Then follows the description of a new milking apparatus which has recently appeared under the name of the Eichloff-Schümannsches Milchgewinnungsverfahren (the E.-S. process for obtaining milk). It is designed for the purpose of excluding all possibility of germs, dirt, etc., falling into the milk. It consists of a milk pail, a cooler, and a collecting vessel, all specially constructed, and a leather thong to fasten the cow's tail.

The milk pail is oval-shaped with a spout to pour out the milk, and with a lid in which is fastened a curved trumpet-like funnel for collecting the jets of milk. Both the funnel and the spout are furnished with properly fitting covers. The first milk drawn is thrown away as it often contains germs.

After milking, the funnel is at once closed, and the milk poured into the cooler, whence it passes into the collecting vessel, having a capacity up to 100 litres, from which the milk bottles supplied to the public are filled. In this way the milk during its whole passage has only a few seconds' contact with the air. The bottles and all the vessels employed in the process are thoroughly sterilized each time previous to use, in a special apparatus.

Before milking, the cow's udders and shanks are carefully cleansed, and the men are required to disinfect their hands and wear a white linen frock.

As contact with the air is so short, the chance of disease germs entering the milk is reduced to a minimum.

It seems that milk obtained by this process answers completely to all hygienic requirements.

The photographs accompanying the article make very clear the construction and use of this apparatus, which appears to be very satisfactory both practically and economically.

233 Maurice Beau. **Sterilisation of Milk and Cream by the Nielsen Sterilisèr Without Imparting a Cooked Taste.** — *L'Industrie du Beurre*, No. 49, p. 572. Niort, 4 Décembre 1910.

Denmark

Experiments are being made at the Agricultural Experiment Laboratory of Copenhagen with a new model steriliser (Nielsen Steriliser) by which milk and cream can be sterilised continuously at a temperature of 120-130° C. without giving a cooked taste to the products.

The milk is driven by a pump through a series of tubes into a receptacle into which vapour under pressure is driven: it then passes through another set of tubes placed in a receptacle in which a current of cold water is circulating. The butter prepared from this milk has not the slightest cooked taste, whereas a slight taste always remains in the butter made from milk that has been simply Pasteurised.

The only explanation of this difference is, that in ordinary Pasteurisation the milk is in contact with the air, and there seems no doubt that the cooked taste is due to the action of atmospheric oxygen on certain elements in the milk.

234 M. Sarthou. **Measurement of the Catalases in Milk. Determination of its Alimentary Value from its Richness in Bacteria.** (La catalasimétrie du lait. Détermination de sa valeur alimentaire par sa richesse bactérienne). - *L'Industrie laitière belge*, No. 26, p. 206. Verviers, 17 Décembre 1910.

Belgium

The food value of cow's milk is usually determined from its acidity, but this is not sufficient security when dealing with milk required for infants, for the acidity of the milk may vary with the diet of the animal.

M. Sarthou suggests a more delicate process, for verifying the progress of bacterial development.

This process is based on the following fact; cow's milk normally contains a catalase, a dissociating principle, which decomposes hydrogen peroxide, setting free an oxygen which has no effect on gaiacol and paraphenylenediamin. This catalase occurs in very small quantities in milk recently drawn.

From 10 cc. of milk, and 10 cc of water containing hydrogen peroxide and capable of giving off from 10 to 12 volumes of oxygen, the liberation af 1.2 cc. of oxygen is obtained

In addition to this *physiological* catalase, a *microbic* catalase exists which develops in all milk left in contact with air and is due to the functional activity of germs developed in the milk. Therefore the more the milk is contaminated, the stronger the catalytic action.

In milk preserved by cold, the germs do not develop

Experiments by M. Sarthou give the following figures.

Duration		Oxygen liberated
Immediately after milking		0 cm^3
After	3 hours	1.3
»	5 »	2.0 »
	8 »	4.1 »
	10 »	6.6
	14	10.4
»	18	15.0

These figures show the rapidity with which the catalytic property increases with the increasing number of germs.

V. NJEGOVAN. **On the Determination of the Phosphatic Compounds in Milk.** (Zur Bestimmung der Phosphatide in der Milch). — *Biochemische Zeitschrift*, No. 5, pp. 491-493. Berlin, 1910. 235

In order that the phosphates of organic mixtures, etc., may be extracted, either with ether or other similar substances, it is absolutely essential that the water be first eliminated. This is particularly necessary in the determination of the phosphates in milk, and the writer has made, and is still continuing, investigations on the subject.

Germany

In order to eliminate 90 per cent of the water in milk before making the extraction, he added sulphate of sodium to a certain quantity of milk, and the mixture solidified rapidly without the aid of high temperatures.

As the extraction by alcohol has to be made at a temperature of 40-50° C., the dried powder is put into a Soxhlet apparatus heated according to the Buss method.

The writer has also made experiments in separating the colloidal substances of the water and lactose in milk, in order to extract the phosphatic compounds from the residue.

236 Dornic and Daire. **Contribution to the Study of Milk Lecithins.**—*Revue Générale du lait*, No. 17, pp. 385-394. November 20, 1910.

Belgium

This article deals with the study of the lecithins of milk and the different methods proposed for determining them. Messrs. Dornic and Daire, starting from the fact that a very large proportion of the lecithins passes into the cream, are studying the hypothesis that the lecithins are a part of the *Schlimmen-membran* of Storch, or the involucrum of nitrogenous matter which adheres to the globule by molecular attraction. During the churning, which causes the fat globules to coalesce, this *Schlimmen-membran* disaggregates and is afterwards found in the buttermilk. The writers have analysed the industrial buttermilks made by the Cooperative Dairy of Surgères, either from naturally fermented cream or Pasteurized cream, and have also analysed several samples of commercial buttermilk.

The table of the chief analytical results obtained shows that buttermilk from cream which has become acidified naturally, or even Pasteurised, contains a larger proportion of lecithins than cows' milk, and a quantity equal to and sometimes larger than that found in human milk.

This fact gives a reasonable explanation of the action of buttermilk as a food, at least during the process of growth, and it determines and explains its therapeutic value as due to lecithins. The fact that buttermilk, which is now considered as an almost valueless by-product, is the economical source of a very expensive and useful medicament, must not be lost sight of.

The natural form in which the buttermilk lecithins are found, evidently makes them more easily assimilated.

237 W. Eichholz. **Determination of Saccharates of Lime in Sterilised Milk and in Cream.** (Zur Nachweis von Zuckerkalk in sterilisierte Milch und Sahne). — *Milchwirtschaftliches Zentralblatt*, No. 12, pp. 536-537. Leipzig, Dec. 1910.

Germany

The adulteration of cream by saccharates of lime has frequently been detected of late. The object of this proceeding is to give a greater density to the cream and the appearance of a higher content in fatty bodies. Saccharate of lime is considered to have a preservative effect on milk and cream.

It is often very difficult to detect this fraud, especially as only small quantities of saccharate are used as a rule. The total lime content of the cream (lime is found in pure milk in the proportion of 0.135 to 0.213 gr. per 100 cm^3 of milk) is so slightly increased by the addition of the saccharate, that it cannot be used as a basis for determining the adulteration.

In order to find the quantity of saccharose contained in milk, the Cotton method, modified by Baier and Neumann, may be used. The process is as follows: 10 cm^3 of the cream to be examined, or of the skimmed milk from which it has been taken, are treated by 8 cm^3 of hydrochloric acid and 2 cm^3 of a saturated solution of ammonium molybdate, and heated for 5 minutes in a water-bath at 80°. C. If there is any saccharose, the liquid turns blue.

The reaction is based on the fact that saccharose hydrolyses very readily in the presence of hydrochloric acid, which is not the case with lactose. And whereas the decomposition of lactose does not take place at a temperature of 80°, C. required by the Cotton method, it readily decomposes at higher temperatures. It is clear therefore that after being sterilised, cream or milk contains hydrolised lactose, and the Cotton reaction is therefore sure to be obtained.

These results have been obtained from the experiments made by Mr. Eichholz, who demonstrates that by heating fresh milk for 15 minutes at 80°.C. or 100° it is not possible to obtain Cotton's reaction, whereas this is certain if the milk is heated for 20 minutes at 100-110° C.

The results with a solution of pure lactose at 4 % were identical.

The Cotton method is the best so far known for verifying saccharates of lime, but means must be taken to ascertain for certain that the milk or cream has not previously been sterilised.

Cost of Winter Milk-Production in Ireland. — *The Farmer and Stock-breeder*, No. 1103, Vol. XXIII, November 14th, 1910, p. 2068. 238

Great Britain and Ireland

In the Journal of the Department of Agriculture and Technical Instruction for Ireland, a summary of experiments which were carried out in county Cork on the cost of winter milk-production is given. The preliminary intention was to ascertain the cost per gallon of producing milk in winter, and also to find out if winter dairying would pay in the south of Ireland. It appears, from the average yield of the cows in milk, that they were, on the whole, good milkers, being credited with 798 gallons [3623 littres] in the course of twelve months, with an average percentage of butter-fat of 3.49. The cows were given during winter, when in full milk, a ration consisting of 56lb. roots, 6lb. cake and meal, 12lb. hay, and 4lb. oat straw. The concentrated food consisted of about two parts decorticated cotton cake, one part bruised oats, one part bran, and one part dried grains. As the yield of milk decreased, the quantity of meal was gradually increased to 4lb. daily. In the springtime, the decorticated cotton cake was replaced by bean meal made from beans grown on the farm. In reckoning the cost of production, the hay was charged at 50s, straw 30s, roots (including the cost of pulping) 10s, soiling with rye and vetches at 15s. a ton. It may be added that after calving, and up to the end of April, the cows were allowed out for an hour or two for exercise, and during the first week in

May, they were turned out to grass night and day, no cake and meal being afterwards allowed. The only hand-feeding supplied after that date, was by soiling; that is to say, a little rye and vetches for a short period until there was a full bite of grass.

Milking is charged at 5d. and attendance during winter at 7d. per week per cow, while fuel was reckoned at 5s. per head. One of the difficulties in estimating the cost of winter milk-production is to know what to allow for depreciation and risk. These items vary in different localities, and even at different farms in the same neighbourhood. Approximating figures from an average of three years, probably 10 per cent. per annum is not an extravagant allowance, with $2^1/_2$ per cent. added for possible contingencies. Reckoning up the cost of feeding and attendance, the following statement is obtained:

FIVE COWS.

	L.	s.	d.	L.	s.	d.
Expenses						
Food, grazing and litter	51	0	6			
Milking	4	5	3			
Attendance (exclusive of milking)	3	15	10			
Service of bull	1	5	0			
Fuel	1	5	0			
Interest on capital £100 at 4 per cent	4	0	0			
Depreciation and loss	12	10	0			
				78	1	7
Returns						
Five calves at 30s. each	7	10	0			
Manure at 18s. per cow	4	10	0			
				12	0	0
				£66	1	7

Cost of producing 3900 gallons, £66 1s. 7d.; equal to 3.97d., or say 4d. per gallon.

In subsequent years, it was found that the cost with a larger number of cows was $4^3/_4$d. per gallon and $4^1/_4$ per gallon. Considering the cost of milk production and the keep of cows, it is to be noted that during the unproductive season—that is to say when the cows are dry—they may be kept much more cheaply on grass than with hand-feeding in the spring. Moreover, autumn calvers have, as a rule, a longer milking period, and are generally in better condition to start next milking season.

It is contended that when milk is retailed in cities at from 1s. to 1s. 4d. per gallon in winter, it may probably pay to give a little more than 6lb. concentrated food to the cow, but when sold at from 5d. to 6d. per gallon, which appears to be the prevalent price in Ireland, the matter assumes a different complexion. The extra amount of food (3lb. daily) would cost 2d. per head.

H. HOFT. **Determination of Fat in Cheese by the Hydrochloric Acid Method.** (Zur Fettbestimmung in Käse nach dem Salzsauereverfahren). — *Chemiker Zeitung*, N. 150, pp. 1343-1344. Cothen, Dec. 1901. **239**

This method, modified by Schmid and Bondzynski, is applied practically in many ways. Hydrochloric acid with a specific gravity of 1.125 is by some analysts considered the best suited for this purpose. Buttenberg and König advise the use of an acid with a specific gravity of 1.19, while Teichert suggests that 1.1 is best when the cheese is watery. **Germany**

Water, or water and alcohol, is used for rinsing vessels when the extraction has been made.

The experiments made by Mr. Hoft, referred to below, show that the greater or less concentration of the acid is of no practical importance, nor is it of any consequence whether alcohol be used or not.

N°	Kind of cheese	Dry Substance %	Fat per cent			
			With alcohol	Without alcohol	Hydrochloric acid sp. g. 1.125	Hydrochloric acid sp. g. 1.19
1	Very fat Tilsitt	62.16	28.73	28.58	—	—
2	» »	64.70	27.94	27.92	—	—
3	» »	66.56	—	—	30.37	30.27
4	Fat »	55.53	19.12	19.15	19.03	19.14
5	Half-fat	61.00	14.92	14.78	14.73	14.70
6	Fat »	67.25	27.99	27.89	27.95	27.83
7	» »	65.83	27.55	27.60	27.58	27.49
8	Very fat »	67.16	28.88	28.80	28.98	28.81
9	» »	62.79	29.79	29.52	—	—
10	» »	57.07	28.59	28.48	—	—
11	Half-fat Gauda	56.93	18.90	18.71	-	—
12	Full fat »	60.86	28.14	28.13	—	—
13	Edam	65.86	32.33	32.00	—	—
14	Very fat Camembert . .	47.46	24.40	24.02	—	—
15	Fat Limbourg	48.10	20.79	20.68	-	—
16	» »	50.07	17.54	17.71	17.58	17.66
17	Fat Romadour	45.61	20.42	20.51	20.54	20.68
18	Poor »	42.87	8.11	8.04	8.02	8.13
19	Fat Wilstermarsch . . .	49.72	16.59	16.74	16.63	16.71
20	$^1/_4$ fat » . . .	43.81	8.00	7.94	7.92	7.99
	Average . . .	—	22.67	22.48	19.94	19.95

A. GOUIN and P. ANDOUARD. **Effects of Early Slaughtering of Animals on Meat Supply.** — (Conséquences de l'Abatage hâtif des Animaux sur la production de la Viande) *Bull. de Séances des la Soc. Nat. d'Agr. de France*, No. 8, pp, 695-697. Paris, 1910. **240**

There would be real danger to the cattle-raising industry in allowing the opinion to become general that the actual insufficiency of meat (and as a **France** consequence its increase in price) is due to breeders slaughtering their animals before they reach maturity.

It is advantageous both to consumer and producer, that animals should be slaughtered as soon as they are fit for food.

Research shows that the cost of feeding includes:

1) The mere maintenance of the body, which should absorb 500 grs. of nutritive substances for each metre of surface;

2) For every kg. gained by the animal there must be about 370 grs. of food absorbed;

3) The cost of transforming this food into living substance amounts to 500 grs. for each kg. of food and for every 100 kg. of body weight.

Considering bull-calves only, a daily gain has been observed of about:

687 gr.	from	5th to the 12th month
776	»	1 to 1 $^1/_2$ years
753 »	»	1 $^1/_2$ to 2 »
570 »	»	2 to 2 $^1/_2$ »

Later this gain continues to decrease.

A gain of 1 kg. living weight has been obtained by feeding with the following quantities of hay:

8.598 kg.	from	5 to 12 months
11.288 »		1 to 1 $^1/_2$ years
14.678		1 $^1/_2$ to 2 »
20.328		2 to 2 $^1/_2$ »

From this last age onwards the cost of production continually increases, growth gradually ceasing.

241 E. MAUREL. **Survival of Coli-bacillus and Eberth's Bacillus on Sausages.** (Survivance du Colibacille et du bacille d'Eberth sur les Charcuteries. — *Comptes Rendus des Séances de la Société de Biologie.* T. LXIX, no. 37. Paris, 23 Dec. 1910, p. 574.

France

Micro-organisms often live on the surface of sweet-meats, pastry and sausages, and experiments have been made as to whether pathogenetic microbes can preserve their reproductive power on the latter.

Such pies, sausages, and saveloys were selected as would be eaten without further cooking. These were first sterilized, and then their surfaces were sown with various pathogenetic microbes. After many experiments, the conclusions arrived at with reference to the coli-bacillus are:

It preserves its reproductive power on the pie, sausage and saveloy at least for 24 hours, and probably not seldom for several days.

Eberth's bacillus is reproductive on pies and sausages for at least 24 hours, but loses it power sooner than the coli-bacillus.

B. MALALIK. **Morphological-Microscopical Study of Wool as a Guide to the Purity of the Breed of Sheep.** (Morphologisch-mikroskopische Studium der Schafwolle als Hilfsmittel zur Beurteilung der Rassenreinheit der Schafe). — *Jahrbuch für wissenschaftliche und praktische Tierzucht*, V. J., pp. 141-153. Hanover, 1910. 242

Germany Servia Bulgaria Montenegro

Morphological-microscopical examination of the wool of sheep in the Balkan Peninsula (Servia, Bulgaria, Montenegro) has led to the following conclusions:

1) The origin of a wool may be established by morphological-microscopical analysis;

2) A pure breed may be distinguished from a cross breed by the same means;

3) The power of hereditary transmission possessed by stud-animals may be estimated by reference to micro-photographs of wool samples.

4) This method, which allows the homogeneity of a wool to be estimated, may also be used in the choice of animals for breeding purposes.

Poultry Experimental Farm at Murray Bridge, S. Australia. — *The Illustrated Poultry Record*. London, November, 1910. 243

South Australia

The S. Australia Journal of Agriculture announces the establishment of a Poultry Experiment Farm with the object of selecting a suitable type. The object of the farm will be to breed poultry for commercial purposes, and to induce farmers in the district to breed better poultry with a view to obtaining a uniform standard in egg production.

QUAJAT. **Silk-worms of the "Carpinese„ Breed.** (Bachi da seta della razza *carpinese*. — *L'Agricoltura moderna*, No. 49, anno XVI, pp. 671-672. Milano, 4 Dic. 1910. 244

Italy: Veneto

During the last silk season at the Royal Sericultural Station at Padua, there were raised, amongst other experimental broods, numerous specimens of the *Carpinese* variety. The result of the experiment was excellent in every way, but, on the market, the cocoons realized 2.20 francs per kilogram, while those of the golden yellow species, and the white Chinese, fetched 3.30 francs.

In order to see whether the Carpinese kind was really so inferior, a sample of all three varieties was spun. The chief results were as follows.

Dimensions of cocoons.

Mean diameter, longitudinal 3.6 centimeres
» transverse 1.8 »

Colour (pale yellow shades):

1 kilogram of living cocoons (8th day) contained	527 cocoons
1 kilogram of cocoons (*desiccated*)	1 203 »

And they produced:

Silk	419.1 gr.
Chrysalids. . . .	580.9 »

In spinning, a good thread was obtained, rough silk, fluff dry and resistent, cocoons with non-compact tissues.

The yield of live weight was 9.09 kilograms for the Carpinese, while the golden yellow variety produced 8.475 kilograms, and the white Chinese 8.849. It should be observed, that this yield was only obtained from cocoons selected one by one, and spun as an experiment. Certainly, under industrial conditions, such figures would not be reached. In the reeling, few breaks occurred.

The physical properties of the raw silk were as follows:

Standard (14/16 being the general average)	15.6 (5 threads spun together)
Tenacity (mean of 20 tests)	55.5 gr.
Elasticity » »	203.1 mm.

It is not reasonable that the cocoons of the Carpinese variety should be somewhat cheaper than those of other kinds, since at the loom the raw silk from the former is roughish, stiff und fluffy. But nothing justifies so great a difference in price as that which was fixed by the market at Padua.

245 F. VALLESE. **Experimental Silkworm-Breeding in *Tilimbars* at Lecce, Italy.** (Allevamento sperimentale del baco da seta in *Tilimbar*). Lecce, R. Tipografia editr. salentina, 1910, p. 20.

Italy: Terra 'Otranto

The rarity of country habitations in many parts of South Italy makes the spread of the silk industry very difficult, and for this reason Mr. Vallese has been making experiments with silkworm breeding in the open air, as is done in Persia, that is, in simply-built sheds (*Tilimbars*) in the midst of mulberry plantations.

He chose Lecce for this experiment as the climate there is so mild during the months of May and June, the spring breeding season for silkworms.

The *Tilimbar* used by Mr. Vallese, built in the Botanical Gardens of the Lecce Agricultural Committee, was a light shed with a conical-shaped, reed-thatched roof. Four light wire-work frames were suspended by chains from the roof.

The silkworms are thus sheltered from the rain, while the sun and wind were expressly allowed free entry.

The breeds used for the experiment, which lasted from May 9th to June 9th, 1910 were Native-Yellow (*Gialla-indigena*) and Old Casentino (*Antica Casentino*). The season was unfavourable but in spite of this the silkworms did not suffer beyond being a little late in rising to the branches for spinning the cocoons.

The following table gives comparative data on the raising of silkworms by this system and in the ordinary way:

Breeding system		Quantity of eggs gr.	Product		Average weight of a cocoon gr.
			total Kg.	per ounce (1) Kg.	
In *Tilimbar*	Native Yellow	1.5	2.800	56.000	1.9
	Old Casentino	1.5	3.350	67.000	2.12
In Nursery	Native Yellow	6.5	13.400	61.845	2.3
	Old Casentino	10.5	22.400	64.000	2

The highest yield in the Tilimbar was given by the Old Casentino and the lowest by the Native Yellow, but the figures are probably inexact as some of the cocoons were taken away by visitors. The cocoons of the *Tilimbar* were not noticeably different from those raised in the ordinary nurseries; their colour was a little paler and duller in consequence of the continuous and direct contact with the light.

The advantages of the Tilimbar system are considerable, even admitting that it may be a trifle slower than the ordinary one. The many serious diseases that are due to high temperature and lack of ventilation in the nurseries are avoided, or at any rate very greatly diminished. It is not necessary to change the mulberry leaf beds frequently, as the residues of leaves and the excrements of the silkworms dry up rapidly without fermenting. Also, by building these Tilimbars in the mulberry plantations, the silk-worms can be continually supplied with fresh leaves without incurring cost of transport.

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(1) Ounce of 30 grams. [*Ed.*].

246 M[illegible]SIER. **The Process of Loading Silk with Metallic Salts.** (Procédé de charge de la soie avec des sels métalliques). — *Bulletin des soies et des soieries.* Lyon, 24 Déc. 1910.

France

Treatment with aldehydes or their combinations with bisulphites gives to silk the power of resisting the effects of light, air, and damp, yet without harming its texture or lustre. All that is needed is the addition to the bath, used after dyeing —or even before applying the mordant or the dye— of 1 to 5 % of an aldehyde compound such as formaldehyde-sodium bisulphite, or else application of the same substances in some other manner to the silk, or the woven products made from it, which, while retaining their beauty, thus acquire solidity and durability.

247 EQUO. **Loss due to Over-Economy in Seasoning Silks.** (Quanto si può perdere risparmiando sulle spese di stagionatura delle sete). — *Bollettino di Sericoltura*, Anno XVII. N. 49, p 480. Milano, Dec. 3, 1910.

Italy: Lombardy

On the example of the Lyons silk merchants, experiments are now being made in Italy in the seasoning of silk, [2 or 3 bales out of 10 being seasoned, so that the market weight of the whole 10 may be established in accordance with the results of the experiment on the 2 or 3 bales. This system is more particularly applied to Asiatic silks, which are supposed to acquire a uniform degree of moisture during the long sea journey. This idea, however, is not correct, as the experiments made by the writer at Milan have verified. In these experiments 10 bales were seasoned in 5 separate lots, and the difference between the net weight and the market weight was established. In this way, the difference between the maximum and minimum loss was found to be:

3.95 kg. for the 1st lot of the net weight of kg. 592.63
2.10 2nd » » 612.31
2.14 3rd » 584.89
2.14 » 4th » » » » 476.34
4.65 » » 5th » » » » » 476.12

These figures show that by saving a small sum on the cost of seasoning, one of the contracting parties inevitably gains, while the other loses, a value corresponding to from 2 to 4 kg. of silk.

248 **Present Conditions of the Trade in Artificial Silk.** (La situazione della seta artificiale). — *Boll. di Sericoltura.* Milan, Nov. 12, 1910.

There is a great crisis just now in the artificial silk trade, in Germany, Poland, England and North America. The situation is less disastrous in

France, because the production there is protected by special conventions. The excessive number of artificial silk factories is responsible for the crisis.

THALLMAYER. **Asclepias Syriaca as a Food for Bees.** (*Asclepias Syriaca* als Bienenfutterpflanze). — *Deutsche Landwirtschaftliche Presse.* Berlin, Dec. 10, 1910. 249

Hungary The value of *Asclepias Syriaca* as a food for bees has been demonstrated at the Garden of the Agricultural Academy of Magyaróvar in Hungary. This plant affords nourishment for the bees during those months when they are unable to find food elsewhere.

The *Phacelia tanacetifolia* is another useful plant for beekeeping.

ENOCH ZANDER. **Diseases and Pests of Adult Bees.** (Krankheiten und Schädlinge der erwachsenen Bienen). Stuttgart, 1911. E. Ulmer. 1 Vol 42 pages with 8 plates and 13 illustrations. 250

Germany The above paper deals chiefly with the diseases of adult bees, and supplies information which has hitherto been wanting, as, up to the present, the best known diseases are those which attack the eggs and larvae.

Mr. Zander deals especially with the malady caused by *Nosema Apis*, a parasite insect, which he discovered in 1907, which owes its name to the strong resemblance it bears to *Nosema Bombycis*, the well-known parasite which causes pebrine.

The importance of the study of the disease, and of the methods of control, can be easily understood, seeing that, in Bavaria alone, 7 000 hives are infected by this parasite, representing a value of 150 000 marks (£7 500).

Protection of Small Birds. — *Revue de viticulture*, N. 890, p. 22. Paris, Jan. 5, 1911. 251

France The Agricultural Society of the Gironde is convinced that the continually increasing number of enemies of crops, and especially of the insects so harmful to vines, *Cochylis* and *Eudemis*, is due to a great extent to the disappearance of small birds. The Society therefore has invited all the agricultural associations of France to unite and insist upon the protection of these valuable auxiliaries of the farmer. An address to the Minister of Agriculture has been submitted to these associations, in which the Society requests the strict observance of the International Convention of March 19th, 1902, with regard to the protection of small birds, and the prohibition of their wholesale destruction by means of nets and snares.

252 **The Bird's-Nest Industry in Siam.** — *Journal of the Royal Society of Arts.* London, 25 Nov. 1910.

Birds-nests form a singular item in the export trade of Siam, the shipments during the fiscal year 1909 amounting to 17 781 lbs, valued at £ 22 000 (Frs. 550 000), most of these nests being shipped to China, Hong-Kong and Singapore. These edible nests are found in the islands off the coast of Siam, and are the products of a species of bird belonging to the family of swifts.

Siam

The season for gathering the nests begins in April and ends in September. The female bird, occasionally assisted by the male, makes three nests in the season. Those taken at the beginning of the season are considered the best in quality. The Chinese, who consume these edible nests, regard them, not only as a great table delicacy, but also as a valuable tonic medicine.

253 **Preservation of the *Huia*.** — *Journal of the Royal Society of Arts.* London, Dec. 16, 1910, p. 131.

The *Huia*, one of the rare birds peculiar to New Zealand, is becoming rapidly extinct. To prevent its utter extinction, a scheme is now on foot to find specimens of the breed, and place them on one of the island sanctuaries off the coast.

New Zealand

The *Huia* is a jet black bird, with a white band at the extreme end of its tail feathers. The feathers of these birds are much valued by the aborigines; no Maori of importance considers himself becomingly dressed unless one or more *Huia* feathers form part of his head-gear.

254 **Russian Furs.** — *Journal of the Royal Society of Arts.* London, 25 November 1910.

The famous markets for furs in the Russian Empire are Nijni Novgorod, Irbit, Kasan, Kiacta, Astrakan, Tiflis, Kharkov, Baku and Archangel. The principal furs produced in Russia are the ermine, sable, beaver, sea-otter, musk-rat, fox, marmot, etc. Ermine is found in the North of Russia, the finest quality coming from Ischim and Barabinsk, Siberia. Russian sable, obtained from the marten, while not so valuable as ermine, is costly enough to prevent its becoming common. The sea-otter is found in Kamtchatka and is captured in large numbers by hunters and trappers.

Russia

The musk-rat is numerous along the Volga and its tributaries. The fur of the Russian fox is of inferior quality to that of the Labrador fox.

The fur of the white Arctic hare is often sold as genuine fox. The value of furs exported from Russia in 1909 amounted to £. 1 250 000 (31 250 000 fr.).

Agricultural Industries.

COSTE. **Diffusion Wines** (1). — *Progrès agricole et viticole*, N. 49. Montpellier, December 4, 1910. **255**

In conformity with the conclusions arrived at by Mr. Coste, in his report on the conditions under which the diffusion process is conducted, and as the result of an inquiry made among wine growers in the Departments of the Gard and Bouches-du-Rhône, Vaucluse, Var and Algeria, the Board of the French South-East Confederation has expressed a desire that the preparation of diffusion wines be regulated as follows: **France**

1) The contents of diffusion vats, the quantity of lees used, and the date of beginning and ending diffusion operations, and the manufacture of light wine (*piquette*) to be declared at the Receiver's office; with penalties in default of such declaration or in case of false declarations.

2) The diffusion wines to be kept in separate vessels distinctly marked, for a month from the time of the declaration of production. Mixing either with other vintages, or with first wines (*vins de goutte*), to be prohibited during this month.

3) The preparation of light wines (*piquettes*), before the diffusion operations are terminated, should be prohibited.

4) Diffusion with pressed lees, except for the purpose of distilling, should be prohibited.

G. VERONA-RINATI. **Application of the Benedikt-Zsigmondy Method to the Quantitative Determination of Glycerine in Wines.** (Applicazione del metodo Benedikt-Zsigmondy alla determinazione quantitativa della glicerina nei vini). — *Staz. Speriment. Agr. Ital.*, Vol. XLIII, Fasc. VII-IX, pp. 656-659. Modena, 1910. **256**

This method is based on the property possessed by glycerine of being transformed into oxalic acid if submitted to moderate oxidation. **Italy**

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(1) An attempt has been made, as in the case of sugar beetroot, to separate by means of diffusion, the must and useful principles from the skins, pips, and stalks of the grapes.

This operation only applies to the lees after tunning, and reduces the loss in pressing from 14 or 16 % to 2 or 3 %.

M. Roos, the inventor of the method affirms that with properly applied diffusion-

This reaction, proposed by Fox for the quantitative determination of glycerine, has since been modified by Benedikt and Zsigmondy. Good results are obtained, even in the determination of small quantities.

A molecule of oxalic acid is formed for each molecule of glycerine, according to the equation:

$$C_3 H_8 O_3 + 3 O_2 = C_2 H_2 O_4 + CO_2 + 3H_2O.$$

When applying this method to wines, all the substance must as far as possible be eliminated, which by oxidation may produce oxalic acid, thus probably altering the final results. M. Verona-Rinati proposes the use of baryta solution for this purpose, describing his method and giving comparative analyses, by which the method is shown to be satisfactory.

257 W. Windisch and G. Dans. **Use of Rice in Brewing.** (Ueber den Einfluss der Mitvermaischung von Spitzmalz, Gerste und Reis zu Langmalz auf den Stickstoffgehalt der Wurze). — *Wochenschrift fur Brauerei*, XXVII Jahrg., No. 50, pp. 621-623. Berlin, Dec. 10, 1910.

Germany

The writers affirm that the nitrogen content of wort or beer is in inverse proportion to the amount of rice used in place of malt in their preparation (cf. Wyat and Schlichting, *Journal of the Institute of Brewing*, 1898, p. 684).

Thus by employing rice in brewing beer, the nitrogenous content is reduced, whilst the alcoholic content remains stationary, and the beer is therefore of finer quality and better flavour.

258 G. Filandeau and F. Muttelet. **A Few Words on Mead.** — *Annales des Falsifications*, No. 25, pp. 470-471. Paris, Nov. 1910.

France

Mead is obtained by the alcoholic fermentation of a watery solution of natural honey, but if the solution is left to itself, the fermentation starts badly, goes very slowly and develops secondary fermentations which injure the quality of the product.

In order that this inconvenience may be avoided, the solution is sterilised by being heated to boiling point, and some nutritive substances (tartaric acid and ammonium phosphates) necessary to the satisfactory development of the yeast are added. The solution is then treated with pure

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batteries, the first liquid which is drawn off cannot be distinguished from natural wines by analysis.

It therefore seems, that diffusion wines should be put on a level with wines obtained by pressure.

This does not meet with the approval of the Excise, for it is feared that diffusion, when badly carried out, would result in the production of light wines (*piquettes*) which would be used, to dilute natural wines. P. Pacottet, *Vinification*, in *Encyclopédie Agricole*, Wéry, Paris, 1908, pp. 339-349. [*Ed.*].

selected wine yeasts. Honey is often adulterated by the addition of inverted sugar.

The fact that hydromel cannot be manufactured without natural honey, shows that it contains some specific elements: for instance, dextriniform substances which are clearly revealed by saccharimetric examination.

In most cases, the use of false honey, especially of artificial inverted sugar, is revealed by testing for furfurol compounds.

E. L. **Distilling Alcohol From Wood Waste.** — *La Revue Scientifique.* Paris, Dec. 10, 1910. **259**

Messrs. Even and Tomlinson, of Chicago, have brought out a new process for the industrial preparation of ethyl alcohol from wood. Timber waste, shavings and sawdust, are treated under pressure in a digester, at a temperature higher than 100°, by a current of water vapour and sulphur dioxide. At the same time as the saccharification of the amylaceous substances is produced, the essence of turpentine, balms and resins are volatilised and carried off, to be afterwards collected.

United States

The wood waste is then put into a diffusion battery and methodically exhausted. The liquor, neutralised with lime, is then submitted to alcoholic fermentation, with a special selected yeast, and afterwards to the ordinary distillery operations.

Six gallons (about 23 litres) of alcohol at 90° can be made from a cubic metre of wood sawdust.

The Liberian Sugar Industry. — *Journal of the Royal Society of Arts.* London, Nov. 18th, 1910. **260**

Along the banks of Liberian rivers stretch thousands of acres of land that might be profitably used for the raising of sugar-cane. In the case of forest land, the undergrowth is cut in January and the large trees felled about the beginning of February. After two or three weeks the dried vegetation is pulled up and the débris burned off. The land is dug up with hoes in rows about six feet apart. The canes are then planted and after three months attain a height of three or four feet. In nine or ten months the cane is ready for cutting, which is done with cutlasses, the tops with three or four joints being preserved for replanting. But cane-culture in Liberia is undeveloped. There is great need for capital to provide suitable machinery for preparing the soil, and for the introduction of modern methods of culture. Almost all the sugar consumed in the country is imported beet sugar. This is largely due to lack of capital, which prevents the sugar-planters of Liberia from competing with the beet-sugar producing countries.

Liberia

261 **Sugar in Java and in British Guiana.**—*The Philippine Agricultural Review*. Manila, Nov. 1910.

Sugar planters in Java have adopted modern scientific methods wherever possible, thus forging ahead with increasing success, while less progressive planters in other localities have remained more or less stationary.

Java British Guiana

In British Guiana, for instance, the sugar output has not increased since 1894, and there have been no notable improvements in cultivation. The disease that attacked the Bourbon cane and swept through the plantations has been responsible for much loss. Then, too, the cane is grown year after year on the same soil, which is thus exhausted and yields an inferior product. The necessary drainage systems are expensive, and labor has to be largely imported. From all accounts, the trouble in the West Indies, especially in British Guiana, seems not to be that the planters are unwilling to spend money on their estates, but that they adhere to inferior systems of cultivation.

In Java, on the contrary, the sugar industry has increased with great strides. The plantations there were also as severely visited by disease (*sereh*) as the cane plantations in British Guiana. But in Java nurseries were at once established from which perfectly sound canes were obtained for planting. In Java the land is planted in sugar only once in three years, and the cane is cut at eighteen months.

In 1908 there were 117 579 hect. of land under sugar cultivation in Java, and the crop amounted to 1 242 000 tons. The elaborate irrigation works in Java will, it is estimated, increase the area planted to sugar, so that the total yield in the course of a few years will increase to 1 500 000 or 1 600 000 tons.

Though the amount of cane produced per hectare has so greatly increased in Java, the proportion of sugar extracted from the cane has not increased, though the quality has improved. Another interesting fact is that while in 1894 there were 195 sugar refineries in Java, in 1908 there were only 178, although the production of sugar had in the meantime more than doubled. This would indicate that the Javanese planters are convinced of the value of concentration and of conducting operations on a large scale.

262 **Sugar Cane Wax.** *Royal Botanic Gardens, Kew. — Bulletin of Miscellaneous Information*, No. 9, pp. 355-356. London, 1910.

A new method of extracting the wax of the sugar-cane is here described.

Java

When the cane is crushed, and subsequently extracted with hot water, nearly all the epidermal wax passes into the crude juice, where it remains suspended, until the juice is purified by the addition of lime and subsequent boiling, when the wax is carried down in the precipitate formed.

On filtration the wax is found in the so-called "filter-dirt," which remains in the filter press, and which may contain 10 per cent or more of wax.

By extracting fresh filter-dirt with ligroine (light petroleum) a complicated mixture is obtained, consisting mostly of fats (glycerides of oleic and linolic acids) and about 30 per cent of vegetable wax. If the filter-dirt has fermented for some time, the fats have disappeared and the ligroine extract consists mostly of the wax, which is more resistant to bacterial action. The wax may be separated from the fats by crystallisation from ligroine, in which it is less soluble; it then consists chiefly of myricyl alcohol and a substance of the formula, $C_{33} H_{68} O$.

The product may be bleached by means of chlorine or fuller's earth and it then closely resembles the valuable Carnauba wax (obtained from the Brazilian Palm, *Copernicia cerifera*), which is worth 11*d.* per lb. (about 2.25 francs a kilog.).

The extraction of the crude material is being started in Java, where, it is calculated, more than 4000 tons of wax should annually be obtainable. The cost of production being estimated at 1*d* to 3*d* per lb., this industry seems likely to give very satisfactory results.

G. D'IPPOLITO. **Rapid testing for *Melampyrum, Lolium temulentum* and *Lathyrus* in Wheat Flours by means of Special Chromatic Reactions.** (La ricerca rapida del Melampiro, del Loglio e del Latiro, nelle farine di frumento mediante alcune loro speciali reazioni cromatiche. – *Staz. Speriment. Ital.*, Vol. XLIII, fasc. VII-IX, pp. 585-591. Modena, 1910). **263**

Italy

In the examination of *Melampyrum arvense*, 5 or 6 grams of the flour should be spread on a small glass plate, moistened with hydrochloric acid diluted at 10 per cent, mixed well together and heated over a flame until the liquid acid has nearly all evaporated. If the flour contains *Melampyrum*, more or less extended spots will appear on the surface, or points of a greenish colour of variable intensity and extent, according to the degree of corruption.

A similar method should be adopted as a test for *Lolium temulentum* and *Lathyrus Aphaca*, and if either of these substances is contained in the flour, bright red spots will appear on the paste, the number of spots being proportional to the number of noxious seeds in the paste. The *Lolium* shows even before the paste is heated, and the colour is orange-red, but the *Lathyrus* does not appear until the paste is held over the flame, and shows then a wine-red colour.

Mr. D'Ippolito made a microscopic examination of the *Lolium* for the purpose of determining its characteristics, this impurity being the most injurious of the three.

A coloured table illustrates the article, showing the results of the tests.

264 CARL G. SCHWALBE. **Treatise on Cellulose** (Die Chemie der Cellulose unter besonderer Berucksichtigung der Textil- und Zellstoffindustrien. Erste Halfte p. 272, Borntraeger, Berlin, 1910). — Abs. *Nature*, Vol. 83, N. 2142, p. 67. Nov. 17, 1910).

Germany

The first volume of this work, just published, is an important contribution to this section of organic chemistry. The book deals with Cellulose from the chemical as well as the industrial point of view. The second volume will be out shortly.

265 **Food Consumption in Paris.** — *Journal of the Royal Society of Arts*, London, Dec. 2, 1910.

France

In Paris, dealers in horse flesh and asses' flesh are required by law to indicate the nature of their business by placing a horse's head as a sign over their shop doors. This is to protect the unsuspecting public, frequently unable to distinguish between beef and horse flesh. Reliable statistics, quoted by the American Consul in Paris, show that Paris consumes annually 347 million lbs. of beef, veal, and mutton (157 million kg.).

To this must be added 78 million lbs. of pork (35 million kg.) and nearly 9 million lbs. (4 million kg.) of pork products, including sausages and sausage meats. In addition to this, the consumption of horse and mule flesh is large, exceeding annually 29 million lbs. (13 million kg), representing about 61 000 animals.

The total amount of meats of all kinds consumed annually in Paris reaches the figure of 455 million lbs. (206 million kg.); 48 million lbs. (21 million kg.) of poultry are eaten in Paris annually and the consumption of game amounts to 3 million lbs. (1-3 million kg). Large numbers of rabbits are also fattened for the market.

That the Parisians are also great fish eaters is shown by the number of pounds sold annually, as follows: Sea fish, 87 millions (39 million kg.); fresh, water over 6 millions (2.7 million kg.); smoked, 343 000 (155 000 kg.); salted, 22 000 (10 000 kg.); total, 94 million lbs. (42 million kg). Oysters, mussels, shellfish generally, and snails, also find numerous eaters, for their consumption is relatively important: 25 million lbs. (11 million kg.), in addition to over 1 million lbs. of snails and crawfish.

The consumption of vegetables in Paris reaches the following figures: —General vegetables, 31 million lbs. (13 million kg.); mushrooms, nearly 9 millions (4.07 million kg.); and watercress, 13 million lbs. (5.88 million kg.).

As to butter and eggs, Paris consumes of the former annually, 33 million lbs. (15 million kg.), and of the latter, 29 millions (13 million kg.), and this, notwithstanding the fact that both these products command throughout the year an extremely high price

Of late years Paris has been consuming many eggs imported from Germany, which country in turn buys from Russia, England, Italy, and America. The consumption of fruit reaches 46 million lbs. annually (20 million kg.) All fruit in Paris is sold by weight, the lowest in price being 2 $^1/_2$ d. per lb., and ranging from that figure to 1 s. 8 d. per lb. Bananas always command a high price, but are of inferior quality.

As for cheese, which is never excluded from a meal in France, the annual consumption reaches over 37 million lbs. (16 million kg.), and is divided among the following kinds: — Camembert 21 millions; Brie, 6 millions; Coulommier, 4 millions; Livarot, 2 millions, Gruyère, 2 millions; Mont Dore, 500 000; Port Salut, 260 000; Roquefort. 68 000, Cantal, 62 000; Munster, 62 000; and other kinds, 2 millions lbs.

E. Beck. **Blood as Food.** (Ueber die Ausnutzung des Blutes als Nahrungsmittel). — *Chemiker Zeitung*, XXXIV J., No. 145, p 598. Cothen, December 6, 1910. **266**

Germany

Foods with a blood basis supply albuminoids and fatty substances in the cheapest form, yet a large quantity of blood which might be used for human consumption is lost. It is therefore of interest that the assimilability of these foods should be made known.

Experiments on dogs and men have been carried out with ordinary coagulated blood, account being taken of the content in albumen, fatty bodies, and iron. In every case the assimilation reached a high percentage; for men it was 96 per cent of the dry substance, 98 per cent of the nitrogen, and 90 per cent of the fatty substances.

Fr. Neumann. **New Method of Preparing Cacao Powder.** (Herstellung von Kakaopulver). — *Chemiker Zeitung*, Jahrg. XXXIV, No. 45, p. 598. Cothen, Dec. 6, 1910. **267**

Germany

This is much the best method for preserving and developing the special aroma of the bean in products destined for the market. For this purpose, the ripe capsule, whether natural or treated with alkalis, is not roasted, but simply dried at a temperature rising slowly from 50° to 120°C. The capsules are then husked and crushed, and the seeds carefully cleaned, and subjected to the following processes: pulverisation or reduction to a fatty mass or a still finer condition; treatment or not with alkalis; pounding without interuption for hours or even days at a time at a temperature rising from 35° to 100°C, in a receptacle fitted with wheels, rollers, etc.

The mass thus obtained is then pressed to extract the cacao butter and the cakes are ground and passed through a sieve and once more reduced to powder. It is well not to submit the powder or mass to the massage which is to give it the aroma and flavour, until some little time after the preparation or the treatment with alkalis, and the powder should first be partially compressed to extract the excess of fatty substances.

268 DOMMES. **The Drying of Copra.** — *The Tropical Agriculturist.* Colombo, Nov. 1910.

Ceylon

Discoloured or smoky copra sells at a very low price, because it cannot be used for making vegetable butter without considerable expense.

The kernel of the freshly opened coconut is moist with cocoanut milk, and this causes mould and discolouration. The first stage of drying, therefore, requires a fairly high temperature, say 60-70° C. (130°-158° F.) or higher. When the outer moisture has disappeared and the pulp is a little dried, the temperature may be lowered to 50° C. (122° F.), but not below, and this temperature must be maintained till the copra is at least half dry. To remove the last moisture, the temperature must be once more raised, and the copra must be cooled in an airy room.

For such treatment solar heat is unsatisfactory, and artificial heat is recommended, which is also conducive to much greater uniformity in the product.

Beating the nuts from the trees with a long pole is not recommended, as many unripe nuts are sure to be brought down.

Copra should be dried as soon as the nuts are opened, and the process should be finished in 24 hours.

A ton of copra was obtained from 4438 nuts, in New Guinea; freshly cut kernels gave 62.7 % of dry copra. Dry coconut shells form excellent fuel.

269 **Cereal Silos of Bremen.** — *Revue Scientifique.* Paris, Dec. 3, 1910, p. 724.

Germany

Climatic conditions compel the Germans to erect large agricultural desiccators as well as to construct well arranged silos. The following is the description of some grain silos that are being erected by the Roland Mühle Company of Bremen. They have 24 cylindrical cells of sheet iron, each 5 metres in diameter and 27.50 metres in height, and their capacity is of 12 000 tons. This means a pressure of 24 tons per square metre, which requires an enormous resistance. To avoid all possibility of the foundations giving way, the builders have adopted the ingenious device of distributing the pressure by means of an intermediate platform of reinforced concrete.

The cylinder-silos are sheltered by a roof. This immense structure gives satisfactory financial results.

K. PREISSECHER, **Artificial Cold in the Tobacco Industry**. (Ueber Verwendung Kunstlicher Kalte in der Tabak Industrie). — *Chemiker Zeitung*, No. 146, p. 1298. Cothen, Dez. 1910. Internationaler Kaltekongress in Wien, Okt. 1910. **270**

Austria

Low temperatures have already been used for a long time in Austria for the preservation of the leaves of fine tobacco, and the application of cold in the tobacco industry is daily growing in importance.

Cold acts as a preventive of fungus attacks, and if its effects were more studied, it might doubtless be applied during the successive stages of fermentation. Artificial cold is also employed to preserve fermented tobacco from animal pests.

Agricultural Engineering and Farm Machinery and Implements.

GUIDO ALLORIO. — **Registering Apparatus for Measuring the ploughing of Rice Fields**. (Apparecchi registratori per la misura dei lavori in risaia). *Stazione sperimentale di Risicoltura, Vercelli, Annuario*, 1910, pp. 55-62, Turin, in-8, 1910. **271**

Italy: Piedmont

Guido Allorio, Director of the Mechanical Section of the Rice Culture Experimental Station of Vercelli, Italy, has invented two new machines for measuring tillage work: a traction-dynamograph and a register of the width and depth of furrows.

The first is based on the principle of the registering steel-yard, and the object of its construction was to obtain:

1) a guarantee of the ratio between the unrolling of the diagram paper and the movement of the apparatus;

2) a guarantee of the ratio between the compression of the spring and the displacement of the registering pencil.

3) lightness and easy management of the apparatus.

The second apparatus is a modification of Prof. M. Ringelmann 's registering apparatus for measuring the depth of furrows: it has the Ringelmann device for measuring the depth, much modified, and to this is added a device for obtaining a diagram of the variations in the width of the furrow, the same paper being used for this diagram as for that of the depth.

The Allorio apparatus are particularly useful for measurements in rice fields. The description is accompanied by figures and diagrams.

272 M. Ringelmann. **Report on Bajac's Traction Winch.** — *Bull. des Séances de la Soc. Nat. d'Agric. de France*, No 8, pp. 706-718. Paris, 1910

If the resistance of the different machines which are to be drawn by this traction-winch does not exceed certain limits, the latter acts as an ordinary traction-engine, i. e. it draws the machine after it, and two men are employed, one on the engine, and the other on the plough which it is towing.

France

Should, however, the resistance of the latter be excessive, the motor portion of the traction-winch alone advances. It proceeds very quickly, unrolling, as it goes, a cable attached to the machine which has to be dragged along, then it stops, and the winch is engaged.

At the same moment, the motor-portion comes automatically to rest, and the energy thus set free, is used by the winch for winding up the cable, and drawing along the plough.

When the plough has been drawn up to it, the motor advances again, and the same process is repeated.

The interesting feature of this invention is, that it obviates any previous installation of cables, anchors or pulleys, and enables heavy work to be done by two men: the engineer and the plough-driver.

The traction-winch is mounted on 4 wheels, carries a 4 cylinder motor of from 24 to 30 HP., and works with benzol at a comparatively small cost.

The following are data of experiments carried out on the farm of M. Chambard at Avrigny, Oise:

Duration of work, 7 hours.

Two-furrow balance-plough (with furrow cutters) weighing 910 kg.

Length of furrow 750 m.; made in four journeys, or successive displacements of the tractor-winch.

Depth of tillage, 0.35 to 0.38 m.

Total breadth tilled, 12 m.

Total surface tilled in 7 hrs., 90 ares.

Consumption in 7 hours:

Benzol	40 litres
Oil	3 »

Price paid at the farm:

Benzol .	0.25 fr. per litre
Oil. . .	0.65 » » »

Two men: engineer and labourer.

Several other trials are mentioned. Two prints illustrate the text.

MARTINY. **Motor Plough.** (Stock Motor-Pflug). — *Landw. Umschau*, N. 49, pp. 1214-1216. Magdeburg, Dec. 1910. 273

A description of a new type of plough which appears to have given excellent practical results. The machine is supported by two wheels about 2 metres in diameter, and a third and smaller wheel directs the plough. The two large wheels are cogged and grip the soil, while at the same time the wheel that is in the furrow serves to stir up such part as is not touched by the ploughshare. The ground is not in any way compressed by the large wheels, and the steering wheel has an almost sharp edge, so that it may take hold of the soil. The motor and body of the plough are so arranged that their weight is poised on the axles of the large wheels.

Germany.

Practical experiments have been made at Etzin, Stedten, etc., where, in a soil of average compactness 25 *morgen* (1 *morgen* = 2553 m²) were tilled daily to a depth of 29 cm.

Allowing for depreciation, expenses incurred for benzine, oil, mechanics etc., etc., the average daily cost of this machine is said to be 86 marks (107.50 frs.). Estimating that at least 25 *morgen* could be ploughed per day for 100 days in the year, each *morgen* would cost 3.44 marks (4.30 frs.). The price of the plough is 15 000 marks (18 750 frs.) and it is of 42 HP.

The article is illustrated.

Rice Seed-Drill. (Seminatrici da riso). — *Stazione di Risicoltura, Vercelli, Annuario*. 1909, in-8, pp. 82-100. Turin, 1910. 274

The seed drill invented by Mr. V. Borgogna has given the best results, It is somewhat on the lines of a Sack seed-drill; it is supported on two ordinary wheels and the shaft of the two distributors is driven by the bearing wheels as in the Sack seed drills. The new devices are: the hopper, distributor and furrow cutter. The machine, which is 3 m. in width, and can be drawn by a horse, has no fore-carriage.

Italy

The Mechanical Section of the Rice Culture Station of Vercelli, taking into account the difficulties presented by the common seed-drills for sowing bearded rice (the kind most frequently cultivated), has had a special hopper furnished with distributors intended for bearded rice, constructed under the direction of Guido Allorio, Civil Engineer. The back of this hopper is vertical; the principal distributing organ is an iron spiral placed transversely, which on one side rests in a slot made in the side of the hopper and on the other rests on several gears which carry the seed to the drills.

The new hopper has given excellent results. This article contains a description with diagrams which will enable anyone desiring such a hopper to construct one for himself.

275 W. K. BRAINERD and W. L. MALLORY. **The Efficiency of Hand Separators for Cream.** - (*Virginia Stat. Bull.*, 136, pp. 3 19, figs 10); *Experiment Station Record*, p. 592, Nov. 1910.

United States: Virginia

The Bulletin discusses the different methods of separating milk, and reports trials of hand separators. The writers estimate that the loss to the farmers of Virginia by the use of the shallow-pan system of separation of cream is at least $ 2 000 000 per annum, or more than enough to furnish each dairy farm with an efficient separator.

In the 8 makes of separators tested, the height of the receiving can varied from 36 to 50 $^1/_2$ inches. The average time required to wash the machines ranged from 5 minutes 20 seconds to 7 minutes 14 seconds, but the variation of time was greater with the 4 different men who washed machines than with the different makes. The power required to run the separators, as determined with the cradle dynamometer without water, ranged from 0.038 to 0 014 horsepower; with water, from 0.055 to 0.131 horsepower. The value of the disks was estimated by determining the centrifugal force factor by dividing the square of the velocity by the radius of the bowl, and ranged from 3.899 to 8.927. The capacity per hour varied from 450 to 650 lbs. The time the milk remained in the bowl varied from 4.3 seconds to 21.5 seconds. The separating force factor, obtained by multiplying the centrifugal force by the time, varied from 236 to 1 335. The increased capacity of each machine due to disk or internal devices, as measured by the Sharples, used as a standard of a machine without disks or internal devices, ranged from — 136 to + 537 per cent, but it is stated that these figures are indicative rather than positive, as the margin of efficiency and the actual amount of milk in the bowls, when running, were not accurately determined. It is thought that the close skimming qualities of each of the machines tested were sufficient for practical purposes if the dairyman will observe the rules laid down by the manufacturers for the use of the machine.

276 G. BARBUT. **The "Ideal P. Pugens" Scraper for Vines.** — *Progrès agricole et viticole*, No. 50. Montpellier, Dec. 11, 1910.

France

This implement obtained the highest award for apparatus to be used in the control of Cochylis and Endemis, in the competition which was held at Carcassone (Aude) on November 10th, 1910. The Pugens scraper looks like a small bladed trowel, with one pointed and two rounded angles. The lower surface of this blade, which is made of cast steel, is bevelled so that it forms a series of sharp edges, while the sides are toothed like a saw on a single inclined plane, with blunt points. The blade is 7 cm. long and 3.5 cm. wide, and the saw has 19 teeth, which are easily sharpened.

It is fixed into a wooden handle by a shank of steel wire, strongly rivetted and slightly bent. The length of the tool is 28 cm., the blade being 16 cm. and the handle 12. It is very light, weighing only 150 gr.

The gardener is able to use this tool without bending down and without fatigue. The *Ideal* penetrates well into the vine stock, without injuring it or touching the shoots; 22 stocks per hour have been scraped with it at Grèzes.

The low cost of the tool, 2 fr., brings it within the reach of all vine growers.

A. Feustel. **On the Importance of Automatic Watering Troughs in Cow Houses.** (Einfluss der Selbsttränke auf Leistung und Gedeihen des Viehes). — *Frick's Rundschau*, Nov. 5, 1910. 277

Germany

Mr. Feustel calls attention to the importance of automatic watering troughs in cow-houses from the point of view of hygiene and also, indirectly, of economy. After having adopted this system on two of his farms, he found an improvement in the general conditions of the cattle, especially during the summer months, as well as a higher and more constant production of milk among the cows.

A generally observed fact is that cattle which have water at their command in the cow-houses, drink oftener and in small quantities, especially when feeding, which is of great advantage in food assimilation.

Another fact in this connection, which is very important for the health of the cattle in winter, is that this water is practically of the same temperature as the cow-house, and higher than that outside in the ordinary watering places and cisterns.

The writer strongly recommends cattle farmers to adopt this method, even if it should be necessary, in the lack of a proper water supply, to have recourse to reservoirs fed by pumps. He calculates that the outlay would be made good in a few years by the profits arising from this beneficial system.

PLANT DISEASES

NOXIOUS INSECTS AND OTHER PESTS.

INTELLIGENCE

Phytopathological and Entomological Stations.

P. VOGLINO. **Phytopathological Observatory of Turin. Bulletin, November 1910.** — *Osservatorio Consorziale di Fitopatologia in Torino. Bollettino del mese di novembre 1910* (1). Turin, Dec. 1910, p. 3. 278

This Bulletin gives an account of the diseases observed on trees and field crops during November, 1910, in various localities of Piedmont, in Italy.

Italy: Piedmont

Thirty-five plant-diseases were studied in the course of the month, some of them being due to cryptogams and others to animal parasites. Among trees, the apple was attacked by the largest number of diseases, *Cossus ligniperda*, *Carpocapsa pomonella* and two fungi, *Phoma pomorium* and *Nectria sp.* being found on it.

Amongst field crops, the carrot was attacked by the following: *Heterodera radicicola*, *Rhizoctonia violacea*, and *Cuscuta Epithymum*, while the turnip suffered from *Anthomyia Brassicae*, *Ceuthorrinchus sulcicollis* and *Athrus Haemorroidalis*.

The characteristics by which each disease may be recognised are briefly stated, and practical advice is given for its control.

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(1) The *Osservatorio consorziale di Fitopatologia* of Turin, was founded in 1908, succeeding to the Laboratory of Phyotopathology which had been working since 1905, under the auspices of the local agricultural Association.

It is maintained by a special annual contribution from the Agricultural Chamber (*Comizio Agrario*) and the Agricultural Syndicate, the Savings Bank, the Municipality of Turin and the Ministry of Agriculture, the respective representatives of which compose the Administrative Council. The Observatory is also under the special superintendence of the Ministry of Agriculture.

The object of this institution is to make an attentive study of the diseases of cultivated plants, to examine into their causes and remedies, and to spread among farmers an exact knowledge of the diseases of plants and the best methods of control.

The staff of the Observatory inspects farms, holds farmers' meetings and gathers information regarding the spread of plant disease. The Pathological Museum and the Laboratory are under the direction of Prof P. Voglino. (*Ed.*).

Non Parasitic Diseases of Plants and their Control.

279 A. Richter. **The Mortality of Plants as a Result of Low Temperatures. The Resistance of *Aspergillus niger* to Cold.** (Zur Frage über den Tod von Pflanzen infolge niedriger Temperatur. Kälteresistenz von *Aspergillus niger*). — *Centralblatt für Bakteriologie, Parasitologie und Infektionslehre*, No 25, pp. 617-624. Jena, Dec. 17, 1910, Bd 28.

Germany

Experiments made with cultures of *Aspergillus niger*, a mould generally used in this kind of investigations, have had the following results

Maximow's and Barteczko's observations on the limited resistance of the *A. niger* to low temperatures were confirmed for certain temperature conditions.

The mycelium of this fungus, subjected to a low temperature and then brought into a temperature of + 18°C to + 19°C, does not, according to the prevailing opinion, show signs of life

But when the cultures, after being subjected to temperatures as those of a mixture of ether and carbon dioxide, are raised to *optima* conditions of temperature, i. e. from + 30° C to + 34° C., the mycelium vegetates rapidly, forms spores, while the increased energy of the interchange of gases shows the intensity of its respiration.

It seems that there is a certain adaptation of fungi to repeated congelation.

A minute examination of the hyphae, and the observation of the fungus itself during freezing show that cold does not merely allow of the survival of a part only of the cells or spores, but causes a depression of the whole vital activity and a general enfeebling of the organism. This enfeeblement brings about the final death of the fungus, if, on being thawed, it is put into conditions of temperature which are not sufficiently favourable to it. In these unfavourable conditions, the fungus appears unable to recover from its depressed condition of latent life. During this state of depression, the fungus manifests no vital activity, it does not give off carbon-dioxide, it shows no signs of plasmolysis, and it stains throughout with aniline colours. The cessation of the emission of carbon-dioxide had previously been observed in various parts of organisms as in the investigations of seeds by Koch. In the present case, there is an interruption of the production of carbon-dioxide in a completely vital organism. This fact is very important, because it coincides with a provisional loss of the osmotic properties of the living protoplasmic membrane.

It may therefore be admitted, that the distinction between living and dead protoplasm is lost in the frozen *Aspergillus*. Temperature appears to have something of the same reviving effect on the frozen fungus that water has upon seeds.

If the interruption of vital activity may be considered as a physiological death, then in both cases there is return to life of a dead organic substratum.

KRUGER. **Diseases of the Sugar Beet Caused by the Soil's Reaction.** — *La Sucrerie indigène et coloniale*, No 22. p. 550. Paris, 29 Nov. 1910. 280

It is well known that the acid or alkaline reaction of the soil affects the development of certain plants. Acid reaction is not only produced by the humus itself but also by some manure ingredients. Thus heart-rot and other diseases were set up in sugar beets which had been potted in sand and peat.

France. Austria.

In a district of Austria where all the sugar beets were diseased, it has been proved that heart-rot, dry-rot, and "goitre,, were due to the alkaline nature of the soil. When this was corrected, the diseases were largely diminished.

M. MIRANDE. **Effects on Vegetation of Road-Tarring.** — *Comptes-rendus de l'Académie des Sciences*, pp. 949-952. No 21, Paris, Nov. 1910. 281

Tar affects green plants by the action of the vapours which it gives off at ordinary temperatures. These vapours penetrate the vegetable cells and, by causing the death of the protoplasm by the plasmolytic rupture of the plasmic membrane, give rise to the coloration phenomena which M. Mirande has designated by the general term *blackening* (*noircissement*). The chlorophyllian function in the leaves is suspended through the action of these vapours, and the leaves become *anaesthetised*, in the vegetable meaning of the word.

France

The tarring of roads and paths has an injurious effect on vegetation when a certain amount of tar vapour is mixed with the air, and this occurs especially in calm, warm, dry weather. Tar dust only acts on vegetation as *dust*, and then only when the quantity is considerable.

D. GRIFFON. **Road-Tarring and Vegetation.** — *Comptes-rendus de l'Académie des Sciences*, Tome 151, No 23, pp. 1070-1073. Paris, Dec. 15, 1910. 282

France

From personal observations in Paris, England and the South of France, M. Griffon considers that road-tarring, although it has had an unfavourable influence on the neighbouring vegetation in certain special cases, should not be condemned before experiments have been made on a large scale and under practical conditions.

283 H. Coupin. **The Influence of various Volatile Substances on Vegetation.** — (See page 42 of this *Bulletin*).

284 Th. Grohmann. **Damage Caused to Woods and Forests by the Products of Combustion, and Remedies to be Used.** *Erfahrungen und Anschauungen uber Rauchschaden im Walde und deren Bekampfung*, in-8°, pp. 44. Berlin, Parey, 1910.

This book is divided into three chapters:

Germany

1. Damage to forest trees by factory chimneys, through: (*a*) corrosive action; (*b*) disturbance of respiratory process;
2. How to estimate the amount of this damage;
3. How to remedy it.

The trees most sensitive to acid exhalations are: the Pine, among Conifers, and the chestnut among deciduous trees. By giving the greatest sensibility a value of 100, Mr. Grohmann has obtained by experiment the following scale for Conifers: Pine, 100, Larch, 20, Weymouth Pine, 15, Scotch Pine, 10 and Fir 5.

Trees with deciduous leaves may be ranged in the following order, beginning with the highest degree of sensibility: Chestnut (*Castanea*), Linden (*Tilia*), Maple (*Acer*), Mountain Ash (*Sorbus Aucuparia*), Ash (*Fraxinus*), Beech (*Fagus*), Hornbeam (*Carpinus Betulus*), Alder (*Alnus*), Birch (*Betula*), Acacia (*Robinia pseudacacia*), and Oak (*Quercus*). However, deciduous trees are never much damaged.

There are, as yet, no well established rules for estimating the injury done to trees by the acid products of combustion.

There are no effective remedies known, but the following measures may have some preventive effect: the lower the trees, the wider apart they should be planted; planting relatively resistant species, especially deciduous trees; avoiding undue clearing away of grasses and low thickets, and finally forming mixed woods, so that the taller trees may protect the others. These however are merely palliatives, and the only way to prevent factories' causing this damage is by using electricity instead of coal.

285 K. Löckermann. **Damage caused by Smoke, and Remedies.** (Rauchschäden und ihre Bekämpfung).—*Mitteil. über Weinbau und Kellerwirtschaft*, No 12, pp. 181-187. Geisenheim, Dez. 1910.

Germany

Viticultural journals have pointed out that of late years considerable injury had been caused to vineyards near the railway station and the locomotive depot at Kochem, on the Moselle. It had been remarked that the vintages were decidedly poor, and this was considered to be due to the injurious effect of smoke.

This damage was supposed to be caused by the direct action on the leaves of the acids contained in the smoke, so that the leaves suffered, and consequently assimilation was injured.

The vines were further injured by the acid gases, which, dissolving in the rain, acted on the organs of the plant, the appearance of which, under these circumstances, was very characteristic. Similar damage has also been remarked in orchards and gardens.

Wieler observed that there was usually a strongly acid reaction in the soils where the plants harmed by smoke were growing, and, according to him, the injuries thus caused are mainly indirect; that is to say, the acids in the smoke dissolve the lime contained in the soil, which thus becomes impoverished in an element indispensable to plant life.

It would therefore be advisable to try liming the orchards and vineyards damaged by smoke.

O. REITMAIR. **The Leaf Shrivelling Disease of the Potato** (Die Blattrollkrankheit der Kartoffel). — (*Zeitschr. landw. Versuchsw. in Oesterreich*, XIII, p. 48, 1910); *Botanisches Centralblatt*, Bd. 116, No 1, p. 18. Jena, Jan. 3, 1911. **286**

Austria

Mr. Reitmair puts forward the hypothesis that there might be some relation between this disease and certain alterations which are produced in the root tissues of the plants. He further considers that a complete study of the disease would necessitate the most minute histological and anatomical investigation of diseased individuals.

J. WESTERDIJK. **Tomato " Mosaic „ Disease.** (Die Mosaikkrankheit der Tomaten. (*Mededeel. uit het Phytop. Laboratorium Willie Commelin Scholten*, Amsterdam, I, 1910); *Botanisches Centralblatt*, Bd. 116, No 2, p. 52. Jena, 1911. **287**

Netherlands

According to Mr. Westerdijk, the tomato " *Mosaic* „ is an infectious disease which is not determined by any organism, but by a special *virus*. It infects the meristem only, having no influence whatever on tissues already developed. When a plant is artificially infected, " mosaic „ spots and deformities are caused which are never found on naturally infected plants. The disease becomes more virulent in bright sunlight. The virus is destroyed between 50° and 100° C., but if dried, it retains its power longer. Unlike the tobacco " mosaic, „ this disease is hereditary in the case of tomatoes.

288 I. LINSBAUER. **The " Droah „ Vine Disease in Lower Austria.** (Der " Droah „ eine niederoesterreichische Rebenkrankheit. *Jahresbericht des Vereins fur angew. Botanik*, 1900. Berlin 1910, pp. 112-118, with three figures). *Rivista di Patologia vegetale*, IV anno, No. 17, pp. 267-268. Pavia, November 30, 1910.

Austria

The vine growers of the valley of Kamp (lateral valley of the Danube), give the name " Droah „ to a disease of the vine which is characterised by a particular erection of the vine branches of the diseased stock, which grow upwards, losing their inflorescence, and are much shorter than usual. The internodes are shorter, and the leaf tissue dries up, leaving nothing but the veins, and by degrees the whole plant perishes. This disease appears after cold and dry winters, and the weather is, according to Mr. Linsbauer, the cause of "droah."

289 C. MANICARDI. **The *Strina* of the Chestnut Tree in the Province of Modena, Italy.** (Intorno alla cosidetta *Strina* del castagno nel Modenese). — *Stazioni Sperim. Agrarie Italiane*. vol. XLIII, fasc. VII-IX, pp. 550-562, Modena, 1910.

Italy: Emilia

This disease has been called " Strina „ by the agriculturists of Modena. The plants attacked look as if they had suffered from excessive artificial heat. Generally speaking, the disease shows itself in the months of August and September. The plant turns from green to yellow, and in the space of 10 or 15 days loses all its leaves. The immature fruit still left on the branches either fall off, or give a very poor crop.

The chestnut *Strina* must not be confounded with the diseases of the chestnut produced by *Septoria castanicola*, Desm., but must be set down to genuine physiological disorder.

The disease may be prevented by careful cultivation, dead plants being replaced and new chestnut groves formed from seed plants, the earth being banked up round the roots which have been uncovered by the rains during the winter, and plenty of suitable manures being used.

290 **A new Disease of the Sandal-Tree in Mysore, British India.** — *The Gardener's Chronicle*, Vol. XLIX, No. 3655, pp. 20-21. London, Jan. 14, 1911.

British India

The disease of the Sandal-tree (*Santalum album*) locally known as "Spike" has appeared in Mysore.

The plants attacked have the tendency to form a larger number of leaves, but they are much smaller in size, and are stiff and soon fall. No flowers are formed and the tree dies.

The cause of the disease has not yet been determined, and no effective remedy is known (1)

Parasitic Diseases of Plants.
Generalities — Parasitism — Bacteria and Fungi as Parasites and Saprophytes. —Remedies

291 HARVEY JOHNSTON **Fungoid Diseases on Fruit Trees in New South Wales in 1909** — *Report of the Government Bureau of Microbiology for 1909.* Sydney, 1910, pp 55-56

Australia: New South Wales

CHERRY-TREES — The only diseases found were a perforation of the leaves due to a Phyllosticta, and a scab on the fruit

PEACHES AND NECTARINES The most usual diseases were *Puccinia Pruni* and *Monilia fructigena* Some species were also attacked by leaf curl due to *Exoascus deformans*, by *Clasterosporium carpophilum* (*Coryneum Beijerinckii*), which causes spots on the leaves and the complaint known as "Die back", by *Rhyzopus schizans*, producing the disease "Split Stone", by *Cladosporium carpophilum*, by *Dematium pullulans*, etc

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(1) In 1892, attention was drawn to the appearance of a disease among the sandal-trees, which was attributed to the borer beetle (LEHMAN *Ind For*, 1901 XXVIII, 97). Stebbing (*Ind For*, 1903, XXIX, app.) furnished a useful account of the insect enemies of the plant In the Forest Administration Report of Coorg for 1903 it was stated that 20 800 diseased trees had been uprooted

Similar reports exist regarding other districts, while many writers affirm that the extermination of affected trees has not checked the spread of the disease. Mr. McCarthy, Deputy Conservator of Forests, would appear to have been the officer who first recorded the disease and who apparently gave it the name 'Spike' The diseased branches seem to shoot up, forming narrow, thick, stiff leaves, reduced in size as the disease advances The disease spreads to branch after branch, no flowers are formed, and finally the tree dies Both Butler and Barber have examined with care diseased trees, but have failed to discover a fungus or micro-organism present in or upon the diseased tissues The roots of diseased trees have been traced from the stem to their ultimate fibrils, and long before their parasitic haustoria were reached, those roots were very frequently found dead. Butler suggested that the disease somewhat resembled "Peach yellows," and acting upon this idea, experiments were performed to test whether it could be communicated by budding This was found impossible It would thus seem that as yet no satisfactory explanation of the disease has been given, but most forest officers consider that it proceeds from imperfect nourishment, due to the insufficiency or unsuitability of the associated plants upon which the sandal tree is parasitic (G WATT, *The Commercial Products of India*, London, 1908, Disease of the Sandal, p 977). [*Ed.*].

Plums. — The only disease which occurred was "Brown Rot of the fruit, caused by *Monilia fructigena*.

Apricots — Among the diseases met with was *Rust* (*Puccinia Pruni*), spots on leaves (*Phyllosticta Persicae* and *Phyllosticta sp.*), Leaf curl (*Exoascus deformans*) and a kind of scab (*Cladosporium sp?*) on the fruit

Pears. — The malady most frequently met with was a black spot or scab (*Fusicladium pyrinum*) which greatly resembles, if it is not identical with, a black spot on leaves and fruit of apple trees (*Fusicladium dendriticum*). *Gloeosporium fructigenum* and *Penicillium glaucum* were found on various rotting fruits.

One case of *Phytoptus Pyri* was observed.

Strawberry Plants. — Some cases of leaf spots on the leaves due to *Sphaerella Fragariae* were seen.

Passion-fruit. — The only diseases met with were: lignification of the fruits, and decay of the roots, which was associated with the presence of a fungus (*Fusarium sp.*).

Grapes. — Anthracnose due to *Gloeosporium ampelophagum* on the berries; "False mildew" (*Cercospora viticola*), and Oidium (*Oidium Tuckeri = Uncinula spiralis*) which attacked the leaves, were the chief diseases met with.

Eriobotrya Japonica (*Loquats*). — On some fruits there occurred a species of scab with fungus filaments resembling a *Cladosporium*.

Wheat. — Amongst the diseases observed were black rust and spring rust, caused respectively by *Puccinia graminis* and *P. triticina*. The first is the more dangerous parasite and the second is far more common.

Two species of bunt were recognised (*Tilletia levis* and *T. tritici*). Loose Smut (*Ustilago tritici*) was present and also the smut of rye, (*Urocystis tritici*), and the mildew of cereals due to *Erysiphe graminis*.

Various fungi such as *Ophiobolus graminis*, *Macrosporium*, *Cladosporium* have been found associated with a fairly common disease known as "*take all*."

The first of these fungi is usually considered to be the cause of the complaint, and Mr. Johnston found it very prevalent on the specimens attacked, but no special fungus has been definitely proved to be the culprit.

Barley. — Two kinds of rust have been found: ordinary Barley Rust (*Puccinia simplex*) and the Black Rust (*Puccinia graminis*). Mildew of cereals (*Erysiphe graminis*) and two sorts of Smut (*Ustilago Hordei* and *Ustilago nuda*) were found.

Oats. — Rust (*Puccinia Zollii*) and Smut (*Ustilago Avenae*) have been identified and the former is of frequent occurrence.

Maize. — Smut (*Ustilago Reiliana*) and Rust (*Puccinia Maydis*) have been seen.

Other plants and vegetables. — *Ustilago Cynodontei* has been found on Couchgrass.

Ustilago bromivora on *Bromus arenarius; Puccinia Zollii* on wild Oats, and a *Puccinia sp.* on cocksfoot-grass (*Panicum Crus-galli*).

Other diseases:

LUCERNE. — Spots on leaves (*Pseudo-Peziza medicaginis*). Rust (*Uromices striatus*).

BEANS. — Anthracnose (*Colletotrichum Lindemuthianum*).

PARSNIPS. — Rootgalls, due to *Heterodera radicicola.*

PUMPKIN, SQUASH, MELONS. — Mildew due to *Oidium erysiphoides.*

TURNIPS AND CABBAGES. — Club-root (*Plasmodiophora Brassicæ*)

BEETROOTS. — Leaf spot due to *Cercospora beticola.*

POTATOES. — Irish blight, due to *Phytophthora infestans:* leaf-spot, often known as early blight, due to *Alternaria solani;* dry rot of the tubers, due to *Fusarium solani;* bacteriosis or *Milky Eye* (*Bacillus solanacearum?*); scab, *Rhyzoctonia solani;* galls produced by *Heterodera* (*Tylenchus*) *devastatrix;* brown fleck or internal brown spot, as well as conditions such as sun-scald and wither-tip; many samples showed injuries caused by Rutherglen bug, etc., and some due to larvae of the potato moth *Gelechia operculella* = *Lita solanella.*

TOMATOES. -- Of the diseases met with, the most frequent were black rot on the fruit (*Macrosporium tomato*), and leaf spot due to *Septoria Licopersici.*

A few cases of Tomato rosette were found associated with *Eriophyes sp.* which probably were the causal agent.

Root-galls due to *Heterodera radicicola* and ripe rot of the fruit (*Gloeosporium fructigenum*) were also observed, and some fruits were found suffering from Tomato bacteriosis.

Plant Pests in Tobago in 1909-1910. See p. 242 of this *Bulletin.* **292**

FR. HONCAMP and H. ZIMMERMANN. **Experiments on the Spores of *Ustilago* and *Tilletia* and their Behaviour in the Bodies of Animals and in Manure.** (Untersuchungen uber das Verhalten von Brandsporen im Tierkörper und im Stalldünger). Mitteilungen der landw. Versuch. Station, Rostock. – *Centralblatt für Bakteriologie, Parasitenkunde und Infectionskrankheiten.* Jena, 10 Dezember 1910, 28 Bd., No. 22-24, pp. 590-607. **293**

Germany

With regard to the dangers arising from feeding cattle on the refuse of grain infected by the spores of *Tilletia* and *Ustilago,* M. Pusch concludes, after a long series of numerous experiments, that horses, cattle, sheep and pigs may eat for a long time such infected food, without in any way suffering from it. Rats, sparrows and poultry may die from gastro-enteric hemorrhage as a result of a diet containing large quantities of the above spores, which latter also bring about abortion in pigs and cows with young, and sometimes cause inflammation of the conjunctiva and the mucous membrane.

Further researches on the part of MM. Honcamp and Zimmermann have shown that the spores of *Ustilago* and *Tilletia*, in the majority of cases, lose their germinating power after having passed through the digestive system of horses and cattle (pigs are an exception), and that this fact is probably due to the effect of gastric juices and the excrements.

The danger of infecting soil with spores by the use of manure is very slight, and infinitesimal when the spores are swallowed by the cattle together with infected bran.

The infection caused by infected seeds is a greater danger than that due to spores derived from manure, even when these are freshly diffused, therefore a healthy crop should always be secured by careful selection of the seed. When the grain has its husks intact, it may remain in the ground, even if damp, for a fairly long time before the spores upon it begin to germinate. If the grain of a diseased crop is allowed to sow itself abundantly the disease may be transmitted from one harvest to the next, for the spores on the seed are preserved in the soil reagents, and remain dormant until after the ground has been ploughed, etc.

The spores stand frost, and retain their germinating power in dry ground for at least two years, giving rise to sporidia when they meet with favourable conditions of temperature and moisture.

The sporidia resist external agents, provided the soil is moist, but perish in a period of drought. *Tilletia* infection, therefore, always depends upon the humidity of the ground.

294 E. J. Butler. **A new Genus of the Uredineae.** (*Annales Mycologici*. Berlin, 1910, Vol. VIII, pp. 444-448) (with plate). — *Rivista di patologia vegetale*, Anno IV, n. 16. Pavia, 20 Nov. 1910, p. 245.

British India

This is a description of a new species of Uredineae, belonging to an unknown genus, which occurs on *Olea dioica*, found in the Bombay Presidency, British India, and to which the discoverer has given the name *Cystopsora oleae*.

This parasite resembles *Hemileia* in some points; it produces upon the leaves of *O. dioica* small yellowish patches of a powdery appearance, the source of hyphae, which after having traversed the leaf parenchyma, ramify in the intercellular spaces, and finally unite to form small stroma whence spring the spore-containing receptacles of the fungus.

295 G. Arnaud. **A Contribution to the Study of the Fumagi.** — (*Annales Mycologici*, Berlin, 1910, Vol. VIII, pp. 470-476). — *Rivista di Patologia vegetale*, Anno IV, n. 16, Pavia, Novembre 20, 1910, p. 244.

France

A series of researches on the fumagi (*fumagines*) forming the *Smuts* of the South of France. These *fumagines* do not present definite enough characteristics, to constitute a distinct group, but the *perfect forms* among them (with the exception of *Calicium*) can be placed in the different genera of the immense group of the Sphaeriaceae.

From a physiological point of view, they live for the most part on the common nutritive substrata, and especially on the *honeydew* of insects, though there is no direct relation between the species of insect and the species of fungus.

Amongst the *perfect forms* the following are described as new.

1 *Teichospora meridionalis* (= *Capnodium meridionale*) which lives on the branches of *Cistus monspeliensis*. L., of *Citrus deliciosa*, Ten., *Quercus suber*, L. and of *Nerium Oleander*, L. attacked by different *Coccinellae*.

2) *Teichospora* (*Capnodium*) *oleae*, which has been found on the branches of *Olea Europaea*, L. also infested by *Coccinellae*.

M. Arnaud gives the name *Pleosphaeria Citri* to the fungus which causes the *Fumago* of lemons, which has already been described under the names *Limacinia Citri*, (Brand Pass.) Sacc.; *L. Penzigi*, Sacc.; and *L. Cameliae*, (Catt). Sacc.

Amongst conidial forms are mentioned *Dematium pullulans*, *Cladosporium fumago*, *Alternaria tenuis*, *Macrosporium commune*.

According to M. Arnaud, the polymorphism exhibited by the *Fumagi* is parallel to, if not identical with, that of *Pleospora herbarum*.

G. SEVERINI. **New Plants attacked by *Sclerospora macrospora*, Sacc.** (Nuovi ospiti per la *Sclerospora macrospora*, Sacc.). — *Le Stazioni sperimentali agr. italiane*, fasc. X, pp. 774-758. Modena, 1910. **296**

The occurrence of *Sclerospora macrospora*, Sacc. on wheat has been noted on an area near the right bank of the Tiber, on the estate of Casalina (province of Perugia). The disease, though limited in extent, was of unusual virulence. The infected area had been submerged for a long time. **Italy**

The fungus was recognized there upon the following hosts:

Hordeum vulgare, *Triticum sativum*, *Avena sativa*, *Festuca elatior*, *Alopecurus agrestis*, *Lolium temulentum*, *Agropyrum repens*.

A description is given of the external changes observed in each of the above gramineae, and also of the morphological characteristics of the parasite.

G. TRINCHIERI. **New Micromycetes of Ornamental Plants.** (Nuovi micromiceti di piante ornamentali. Nota II). — *Bull. dell'Orto bot. della R. Università di Napoli*, Tome II, fasc. IV, pp. 495-504. Naples, 1910. **297**

Continuing his studies of the micromycetes which develop on ornamental plants, Dr. Trinchieri describes 6 new species which he has disco- **Italy** vered in the Botanical Gardens of Naples: *Phomopsis Aloes-percrassae, Macrophoma Dyckiae, Ascochyta Haworthiae, Chaetomella Gasteriae, Pestalozzia Aloes, Gloeosporium polymorphum, Colletotrichum Dracaenae.*

These last two species differ from the others in that they attack the living leaves of *Dracaena fragrans*, Ker.-Gawl., which they greatly damage.

298 C. MASSEE. **“Crown Gall„ (Dendrophagus Globosus, Toumey).** — *Royal Botanical Gardens, Kew. Bull. of Miscell. Inform.*, No. 9, pp. 300-312, London, 1910.

Great Britain. United States.

The disease which is known under the name of “Crown Gall” and is spread practically all over the temperate zone, does injury to a large number of cultivated trees such as: pear, apple, peach, plum, apricot, poplar and cherry trees. The damage done in this way, in the United States alone, amounts to a sum of about a million dollars.

The galls appear in the region of the crown or collar and also on the larger roots, in the form of excrescences which are often attached to the stem by a narrow neck. At the end of the vegetative period, they dry up and fall off, leaving an open wound which penetrates to a certain depth in the wood. The following season, new galls form on the edge of the cavity, and the process being repeated each year, a large deep wound results. When two or three such wounds are present on different sides of the stem, its stability is much diminished, and it frequently breaks at the injured part.

The examination of these pathological outgrowths has several times brought to light the presence of different organisms in the affected tissues, but it has not always been possible to determine the specific cause of the disease.

Recently, however, Toumey, whilst examining infected plants of *Chrysanthemum frutescens*, L., was able to establish with certainty that the gall is due to a Myxogaster, *Dendrophagus globosus*, Toumey. If soft and succulent sections of the gall be treated with Flemming's solution, and examined under the microscope, strands of plasmodium are seen permeating the tissues in all directions. In the interior of certain cells, the plasmodium appears as a reticulated vacuolate mass. It is remarkable that during the vegetative period of the plasmodium, not a single trace of starch is found in the tissues of the gall, which fact is probably explained by the presence there of a greater quantity of an oxidising enzym than in the normal tissues.

The plasmodium is finally concentrated in the peripheral cells of the gall, and passes thence to the free surface, where it divides into numerous reddish-yellow sporangia about a millimetre in diameter, which contain a large number of small orange-yellow spores. Traces of a capillitium are present, mixed with the spores.

Some inoculation experiments gave positive results.

On the other hand, the presence of the *Dendrophagus* is a symptom of secondary importance, according to Erwin F. Smith and E. O. Townsend, and *Bacterium tumefaciens* should be considered as the true cause of the disease. The fact, however, that not a single trace of the *B. tumefaciens* has ever been discovered in the numerous galls studied in England, is rather a strong argument against this hypothesis.

As a remedy for the malady, the immediate excision of the galls is recommended, the wound thus made being then covered with a paste of two parts of copper sulphate, one of iron sulphate and three of quick lime.

When the trees are very much injured, however, it is best to remove and burn them, in order to prevent their becoming centres of infection from which the disease may spread to neighbouring trees.

A Parasite of Rusts. - *Report of the Government Bureau of Microbiology for 1909*. Sydney, 1910, p. 57. 299

Australia: New South Wales

In some specimens of plants sent to the Government Bureau of Microbiology at Sydney, Mr. Harvey Johnston found a parasite (*Darluca filum*) preying on the following rusts (1):

Maize rust (*Puccinia Maydis*) (2), wheat rust (*P. Graminis*), oat rust (*P. lolii*) (3), prune rust (*P. Pruni*) and carnation rust (*Uromyces caryophillinus*).

O. OBERSTEIN. ***Cicinnobolos* sp. as a Parasitic Fungus on *Sphaerotheca mors uvae.*** (*Cicinnobolus* spec. als Schmarotzerpilz auf *Sphaerotheca mors uvae*). — *Zeitschrift für Pflanzenkrankheiten*, XX Bd., J. 1910, H. 8, Stuttgart, Dez. 31, 1910, pp. 449-452. 300

Germany: Silesia

In May, 1910, the Agricultural Botanical Station of the Chamber of Agriculture of Silesia received from Schönfeld, Kr. Strehlen, some branches of gooseberry attacked by the well-known mildew, *Sphaerotheca mors uvae*. An attentive examination of the young buds and the green fruit showed for the first time, that a species of the genus *Cicinnobolus* (4) was living as a parasite on *Sphaerotheca mors uvae*.

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(1) The *Darluca Filum* is a fungus of the order of the *Sphaeropsideae* known for some time as a parasite of various Uredineae.

Recently VOGLINO (*I nemici del « Pioppo Canadense di Santena »*, Torino, 1910, p. 53) discovered it also on the uredospores of *Melampsora Allii-populina*. [*Ed.*].

(2) *Puccinia Maydis*, Béreng. — *P. Sorghi*, Schwein (VOGLINO, *Patologia vegetale*, Torino, 1905, p. 198). [*Ed.*].

(3) *Puccinia Lolii* is regarded as a form of *P. coronifera*, Kleb., i. e. *P. coronifera*, Kleb. f. *Lolii*, Eriks. (SORAUER, *Handb. d. Pflanzenkrankh.*, II Bd., Berlin 1906, p. 374). [*Ed.*].

(4) A fungus belonging to the Sphaeropsideae. [*Ed.*].

Mr. Oberstein emphasizes the novelty of this discovery and gives a complete list of the various species of *Cicinnobolus* which have so far been met with as parasites of other fungi, which in their turn are parasites of cultivated or wild plants.

DARNELL-SMITH. **Bunt-Resistant Varieties of Wheat.** — *Report of the Government Bureau of Microbiology for 1909*, p. 66, Sydney, 1910.

Australia: New South Wales

Certain varieties of wheat have the reputation of being bunt-resistant. Observations on this point were made by the writer, comparing the behaviour of three resistant varieties: *Cedar, Florence,* and *Medeah*, with that of three liable varieties: *Comeback, Federation,* and *Bobs*, in the presence of bunt. In one experiment, six boxes were sown with the wheats, twelve seeds in each box, six infected, six non-infected; the infected seeds being planted 7 inches away from the uninfected seeds. The seeds were infected with *Tilletia levis.* Every ear of the bunt-liable varieties became diseased; the bunt-resistant varieties all remained sound, as did all the uninfected plants.

The experiment was repeated, the grains being this time infected with *Tilletia tritici;* precisely similar results were obtained, so that clearly certain wheats have properties which render them immune from bunt attacks. The resistant varieties: *Cedar, Florence,* and *Medeah* have comparatively little beard, and so do not pick up spores easily. Moreover their endosperm is very horny. As regards power of germination and rate of growth, they do not appear to sensibly differ from the susceptible varieties.

302 DARNELL-SMITH. **The Action of Chemical Fungicides on the Germinating Power of Wheat Grains.** – *Report of the Government Bureau of Microbiology for 1909*, p. 66. Sydney, 1910.

Australia

To test the action of chemical fungicides, the germinating strength of wheats, treated and untreated, was compared upon porous tiles kept moist on blotting paper. The following results may be regarded as typical:

Comeback Wheat	Treatment	Number of seeds	Number of seeds germinating after				
			hrs. 24	hrs. 7	hrs. 96	hrs. 144	Total
Not infected .	Not treated	30	28	28	28	28	28
Infected	Formalin.	30	21	25	20	27	27
»	Copper sulphate and lime.	30	28	29	29	30	30
»	» » only . .	30	6	12	17	19	19

There is very little difference between the untreated grains and those treated with formalin or with copper sulphate followed by lime. With those grains treated with copper sulphate only, germination was however considerably affected, A 2 per cent solution of copper sulphate either cripples or kills the seeds, and considering the great need for a young plant to be vigorous and to establish itself firmly in the soil, the use of copper sulphate alone cannot be recommended. Subsequent treatment with lime prevents the deleterious effects of copper sulphate upon germination.

Formalin, which is generally supposed to harden the seed coat, does not appear to greatly hinder germination.

G. D'Ippolito. **The Action of certain Anticryptogamic Substances on the Germinative Energy of some Varieties of Wheat and of Oats.** (See page 80 of this Bulletin. 303

H. Fabre. **Poisonous Qualities of Nicotine and Danger of its Use.** — *Progrès agricole et viticole*, N. 51, p. 746· Montpellier, Dec. 8, 1910. 304

France

Nicotine, which is strongly recommended to vine cultivators as the surest destroyer of the Cochylis, in an eminently poisonous alkaloid. At equal weights, it is much more dangerous than arsenic. The nicotine at present sold by the French Excise is strongly adulterated and coloured; moreover, not being pure. but in the form of sulphate of nicotine, it is less deadly.

It has been proposed to put pure nicotine on the market, but M. Fabre points out the terrible consequences which might result, and estimates that about 5 hectolitres of solution containing 500 gr. of the alkaloid would be necessary for treating the Cochylis over a vineyard of one hectare.

The amount covering the grapes would be about 1/5 of this quantity, or 100 gr. of the alkaloid; and a larger or smaller amount would remain on the grapes up to the time of vintage.

Now there is nothing to prove that this residue is necessarily eliminated before or during fermentation, and it is not impossible that it passes into the wine. Vine growers ought therefore to be most careful in using nicotine especially when they are treating late invasions of insects.

Parasitic Diseases of various Plants and Means of Prevention and Cure (1).

305 F. G. KRAUSS. **Insects and Fungus Diseases affecting Rice.** — *The Tropical Agriculturist*, pp. 505-506. Colombo, Dec. 1910.

Japan

The Rice Export Association of Japan has taken every possible precaution to prevent the exportation of infested grain, but far more harmful than the grain pests are the insects and fungus diseases which affect the plant. The most destuctive of the insects are two lepidoptera which bore into the stem: *Chilo simplex*, Bull., and *Schoenobius bipunctifer*, Walk. The former is double brooded and many larvae will be found in a stem; the latter produces three broods a year, and the larvae will be found singly. It would seem that the danger of introducing these pests lies in the importation of rice straw used for packing. Fortunately they are attacked by parasites at several stages in their life. The most efficient natural enemy is the egg parasite, *Trichogramma japonicus*, Ashm.

Other insect pests are the leaf hoppers, *Delphax furcifer* and *Delphax strictella*, which suck the leaf juices; the rice weevil, *Calandra Oryzae;* a nocturnal moth, *Nonagria inferens*; a butterfly, *Pamphila guttata*; and an aphis, *Schizoneura* sp.

The following are some of the diseases affecting rice in Japan:

1) *Stigmonose* or dwarf disease. This is supposed to be due to punctures made by the leaf-hopper *Selenophalus cincticeps*.

2) *Brusone* a disease causing spotting on the leaves, and due to the attacks of the mucedinaea *Dactylaria parasitans*, Cav. (2).

3) Leaf-blight caused by *Helminthosporium Oryzae*, does considerable damage to the crop in some years.

4) White leaf-blight, the most destructive disease of rice in Japan. The losses caused by it in a single prefecture have amounted to one million yen a year (yen = frs. 2.50).

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(1) The plants are arranged in the same order as in the first part of this Bulletin.

(2) The researches on *brusone* which have occupied the attention of rice-planters for nearly two centuries, have, so far, given contradictory results. VOGLINO attributed the disease to bacterial action, BRIZI put forward the hypothesis that it was due to asphyxia, and to lack of oxygen in the portion of the subsoil which was in contact with the roots. FERRARIS considered *Piricularia Oryzae* Br. et Cav. as the pathogenetic agent, while FARNETI thought *brusone* a parasitic disease due to the action of a single very polymorphic micromycete, which occurs on the affected organs, and in artificial cul-

The Japanese Government last year appropriated 3000 yen for its study, and some promising results have been obtained from these investigations. It appears that white leaf-blight is connected with soil-acidity, a bacterium having been isolated from the diseased plants, which is also found in acid soils. This bacterium loses its virulence in neutral or alkaline soils.

H. H. WHETZEL and W. H. RANKIN. **Tests of Spray Mixtures for *Alternaria* Bligh of Ginseng in the United States.** (*Special Crops*, n. ser. 9, 1910, N. 93, pp. 327-329, figs. 4). — *Experiment Station Record*, p. 547, Nov. 1910 (1). 306

United States

Attention is called to the frequent complaints of a failure of Bordeaux Mixtures to protect Ginseng against the *Alternaria* blight, and it is stated,

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tures, chiefly in the forms of *Piricularia Oryzae* Br. and Cav, *P. Grisea* (Cke) Sacc., *Helminthosporium Oryzae* Miyebe and Hori, *H. macrocarpum* Gar. and Catt. (Grev?), *H. sigmoideum* Cav., *Cladosporium* sp. Gar and Catt., *Hormodendron* sp. Gar. According to FARNETI however, *brusone* is the same disease both in Italy and Japan, seeing that it has the same cause in both countries.

Cfr. V. PEGLION, *Le malattie crittogamiche delle piante coltivate*, Casale, 1904, pp. 144-148.

T. FERRARIS, *Il brusone del riso e la Piricularia Oryzae*, Malpighia, XVII, p. 129.

P. SORAUER, *Handbuch der Pflanzenkrankheiten*, II Bd., p. 441, Berlin, 1906.

U. BRIZI, *Terzo contributo allo studio del brusone del riso*, Ann. d. Istituz. Agr. A. Ponti, vol. 7°, 70 pp., Milano, 1908.

B. M. DUGGAR, *Fungous Diseases of Plants*, Boston-London, 1909, pp. 297-298.

L. PAVARINO, *Il brusone del riso e i possibili rimedi per combatterlo*, Rivista di Patologia vegetale, anno IV, n. 12, Pavia, 1910, pp. 190-192.

R. FARNETI, *Intorno al « brusone » del riso e ai possibili rimedii per combatterlo.* Nota preliminare. Atti Ist. bot. Pavia, vol. X, 11 pp. Milano, 1904.

U. BRIZI, *Intorno alla malattia del riso detta brusone.* Atti Rendic.) Accad. Lincei, ser. V, vol. XIV, Cl. Sc. fis. mat. e nat., pp 576-582, Roma, 1905.

U. BRIZI, *Ricerche sulla malattia del riso detta « brusone ».* Primi studi eseguiti nel 1904. Ann. Ist. agr. A. Ponti, vol. V., pp. 79-95. Milano, 1905.

U. BRIZI, *Ulteriori ricerche intorno al brusone del riso compiute nell'anno 1905.* Ann. Ist. agr. A. Ponti, VI, p. 45. Milano, 1906.

R. FARNETI, *Ricerche sperimentali ed anatomo-fisiologiche intorno all'influenza dell'ambiente e delle sovrabbondanti concimazioni sulla diminuita o perduta resistenza al brusone del riso « bertone » e di altre varietà introdotte dall'estero* Riv. Pat. veg., II, pp. 1-11. Pavia, 1906.

R. FARNETI, *Il « brusone » del riso.* Relazione fatta al terzo Congresso Intern. di Risicoltura. Riv. Pat. II, p. 17-43. Pavia, 1906.

U. BRIZI, *Ulteriori ricerche intorno al brusone del riso compiute nell'anno 1906.* Ann. Ist agr. A. Ponti, vol. VI, 45 pp., Milano, 1906.

R. FARNETI, *Ricerche intorno al brusone del riso ed esperienze italo-americane per l'anno 1907.* Alba agricola, V, pp. 974-975, Pavia, 1907.

R. FARNETI e H. METCALF, *A proposito del brusone del Riso.* Ibidem, VII, n. 142, 11 pp., Pavia, 1909.

D. PODESTA, *Cognizioni odierne sul brusone del Riso.* Savona, Tip. Botta, 1909, etc. [*Ed*].

(1) Ginseng (*Aralia quinquefolia*, var. *Ginseng*) is an Arialiacea from Northern China, from Manchuria, Mongolia, etc. It is a perennial herbaceous plant, the forked conical roots of which are very much appreciated as food in China. A reconstituting power is attributed to them which causes them to be regarded by the Chinese as a genuine panacea. Investigations made in Europe, however, have shown that this repu-

that an investigation has been conducted to determine the effect of different fungicides on the germination of the spores of the fungus which causes the disease.

In the course of these experiments, about 20 fungicide mixtures, as well as Paris green and other insecticides, were compared. The comparison of the effects on the germination of the fungus shows that the most active fungicides against *Alternaria* were: Bordeaux mixture at whole or half strength; Bordeaux mixture and Paris green; Paris green and milk of lime; Paris green alone; milk of lime; sulphur arsenate and perhaps a mixture of lime and sulphur applied as a spray in summer. The Paris green and the milk of lime, either alone or in combination, would be useful, provided it be not proved that eventually they injure the Ginseng plant.

The effectiveness of the Bordeaux mixture was so complete that the addition of Paris green offered no apparent advantage.

The writers conclude by recommending the use of Bordeaux mixture, or even of Paris green. They advise that no new mixtures not previously tested should be used.

307 D. Hegyi. **Root Disease of Young Sugar Beet and its Control.** (A czukorrépa gyökérfekély betegsége és az ellene való védekezés). — *Koztelek*, 1911, Januar 21, 7 szam, 21-ik evfolyam, lap 182-185.

Hungary. Russia. Germany. Holland

This disease, which is so dangerous to the sugar beet, is recognised by the stem of the young plant turning black at some particular spot, and sometimes getting more slender. Usually the plant perishes, but sometimes it survives by throwing off the diseased part by means of the formation of a layer resembling cork.

The first and second sowing of sugar beets in the Great Hungarian Plain were nearly all destroyed by this disease last year.

In the investigations into its cause, several parasites have been found on the young plants: *Phoma tabifica*, *Pythium De Baryanum*, and some soil bacteria. Amongst these bacteria, it is *Bacillus mycoides* (according to M. Hegyi's observations) which chiefly attacks the plants.

As all the tests made with these various pathogenic agents on sound plants had a positive result, it is clear that any of these parasites might cause the malady.

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tation is exaggerated. The Ginseng roots have been found to contain mucilage, a sugar, and some bitter and aromatic principles

The Ginseng cultivated in the United States is very much appreciated in China and has become an important article of exportation. It comes from another variety of the *Aralia quinquefolia*. See. Wright, *The Standard Cyclopedia of Modern Agriculture*, vol. VI, p. 119. [*Ed.*].

The observations made by M. Hegyi agreed with the older experiments of M. Linhart, that the germs may be found on the seeds.

Measures have long been taken in Hungary to secure the soundness of the seed, but the progress of the infection was not arrested. This is to be explained because the agents of the disease are found in the soil as well as on the seed. It is not desirable. of course, to sterilise the soil because it contains useful as well as harmful microorganisms.

The crops from Russian or Hungarian seeds are scarcely ever affected. those from German and especially Dutch seed being the most susceptible. Russian and Hungarian seeds contain from 10 to 12 per cent of water on an average, when they are gathered, while the average water content of the German and Dutch seeds is from 15 to 20 per cent. The latter have to be artificially dried until their moisture is reduced to at most 15 per cent, as otherwise the sugar factories may decline to accept them.

M. Hegyi's supposition that the Hungarian seed, being drier, offers more resistance to the disease, is therefore quite plausible. M. Hegyi's laboratory and practical experiments on artificially dried foreign seeds, have given remarkable results.

A sample of German seed, containing 16.3 % of water, produced 17 % infected seedlings from the first days of germination and the disease increased so rapidly, that within a short time the whole plot that had been sown was destroyed.

Some of the same seed was sown, after being exposed to 55° C. for 24 hours, which reduced its water content to 5.1 %. It germinated 5 days later than the others, and whereas 100 of the undried seeds [glomerules] only produced 158 seedlings, the same quantity of dried seed gave 246 seedlings, which developed rapidly and vigorously, and were always healthy. The best remedy is therefore only to sow seeds which have been thoroughly dried. This shows the necessity for changing the rules laid down by commerce. The farmer must stipulate by contract that the seed shall not contain more than 10 % of water. The best plan would be for the farmer to dry the seed himself, in the small quantities necessary for daily sowing, because it is very hygroscopic. This system however presents a difficulty, for there is as yet no apparatus on the market for drying the seed thoroughly and economically. The writer has made arrangements with the "Hungarian Manufactory of Agricultural Machines" for the construction of an apparatus at a low price which will work at small cost.

It must not be supposed, however, that by thoroughly drying the seeds everything necessary has been done to ensure the satisfactory cultivation of beets in Hungary. There are two other essential conditions for the healthy development of the young crop from dried seed; abundant fertilisers (e. g. superphosphates and salts of potash at 40 per cent), and good cultivation.

308 E. DE KRUIJFF. **The Root Rot of Cassava.** (*Teysmannia*, 21, 1910, N. 3, pp. 147-149). — *Exper. Station Record*, Nov. 1910, p. 547.

Australia: Tasmania

For several years, cassava plants in Tasmania have suffered from a root rot which causes the plants to shed their leaves and the tubers to rot slowly. In the first stages of the disease the epidermis of the tubers turns a violet red. The tubers then begin to rot at the tips, but often some of the tubers on a diseased plant may remain entirely healthy. The diseased plants do not die, but later in the year form new leaves and tubers.

A microscopic examination of the diseased tissues showed the presence of small bacteria, which in pure cultures resembled in many points certain lactic ferment bacteria. Inoculations of healthy plants with the isolated bacteria, and also with raw material from diseased tubers, were made, but gave only negative results. Old and young plants are alike attacked irrespectively of the weather conditions, for the disease is as severe in wet years as in dry.

Favourable results in checking the disease were obtained by liming. More resistant varieties from other regions are also suggested as a possible remedy.

309 W. G. SACKETT. ***Pseudomonas Medicaginis*, a Bacterial Disease of Alfalfa.** (*Colorado Stat. Bull.* 158, pp. 3-32, pls. 3). — *Experiment Station Record*, Nov. 1910, p. 546.

United States: Colorado, etc.

The history, distribution, general characteristics, cause, method of infection, technical descriptions, including the morphological, cultural, physical, and biochemical features of the pathogenetic organism (*Pseudomonas medicaginis n. sp.*), are described, together with the methods of control.

The disease occurs in five counties in Colorado, but is especially destructive throughout the Gypsum Valley in Eagle County, and is also reported from Utah, New Mexico, Nebraska and Kansas.

The unusual fact that only the first cutting was badly diseased, made a satisfactory explanation of the method of infection more difficult. But after a careful investigation of alfalfa fields most subject to the disease, the conclusion was reached that cold and frosts, which cause the epidermis on the stems to split open above the first 6 internodes, thereby exposing the succulent moist tissues to infection from germ-laden dust blown into these cracks, were the main cause of infection. The later cuttings, not having been subject to such weather conditions, escaped serious infection.

For controlling the blight, the introduction of resistant varieties, especially those which can withstand late spring frosts is recommended. The clipping of the frosted alfalfa as soon as it is reasonably certain that all danger from frost is past, thus affording an opportunity for an early growth of a new cutting, is also advised.

R. P. HIBBARD. **Cotton Diseases in Mississippi. U. S.** — *Mississippi Agr. Exp. Station*, Bull. No. 140-B. Jackson, July. 1910. pp. 2-16. 310

United States: Mississippi

Cotton Wilt. Wilt is widely distributed throughout Mississippi. The cotton plant is subject to wilt when about 10 or 12 inches high, and from then on to maturity. Wilt is most abundant in June and July, especially when the rainfall is plentiful in early spring and during the growing season.

The leaves of the diseased plants turn yellow at their margin and between the veins; later the whole leaf becomes yellow and drops off. The wood in the region of the water conducting vessels that pass up the root and stem is brown; and the brown ring so formed is characteristic of the disease.

This disease is due to a fungus: *Neocosmospora Vasinfecta* It is found in the soil as a saprophyte, but when it enters the root and stem of a cotton plant it becomes parasitic. The most efficient method of control lies in the use of resistant varieties.

Anthracnose. Little is known about this disease, which is more prevalent and exceedingly troublesome in the Delta region. The first indication of trouble on the boll is shown in the appearance of small reddish brown spots, which grow larger and become depressed in the tissues of the boll. Soon the spores develop and occupy the centres of these spots. Climatic conditions are responsible for the abundance or scarcity of these spores.

Anthracnose is attributed to a fungus, *Colletotricum Gossypii.* Spraying with fungicides and treating the seeds with poisonous substances have not proved effective. The most successful remedy would apparently be the development of a disease-resistant variety.

Cotton rust. This disease is very liable to appear on wet, poorly drained soils. The first indication of trouble is shown in the yellow mottled appearance of the leaf. Later the leaves fall off and sometimes the stalk is entirely bare. The three important factors to which rust is attributed are: 1) lack of humus; 2) lack of potash; and 3) lack of drainage. The remedy lies in changing the unfavorable soil conditions, and in securing those conditions that will foster a vigorous growth of the plant.

Red rust. The leaves are attacked by a spider-like mite. The injury shows itself by a red colouration of a part or the whole of the leaf. The trouble is of slight importance. No practical remedy has as yet been found efficient.

Damping-off or *Sore Shin.* The young plants first show signs of weakness in the stem near the surface of the ground. The turgid cells lose the water they contain and become flabby. At this point the stems bend and the plants fall to the ground. The sterile fungus *Rhizoctonia* is usually considered the cause of this trouble. As alkaline soils are fatal to the fungus, the addition of lime to the soil would be beneficial.

Bacterial blight. This disease is known to attack the stem, boll and leaf. In the angular spots on the leaves and on the water-soaked areas of the bolls are to be found countless microbes, to which Dr. Erwin Smith gave the name of *Bacterium malvacearum.* No efficient remedy has been worked out.

Shedding of bolls The parts affected change in color from a deep green to a pale green, become yellow and finally drop off. This disease is physiological.

Root-Knot, Root-galls, Root Nematodes. The roots of the diseased plants are covered with warts, galls, or excrescences of various sizes and shapes, and sometimes are as much as an inch in diameter. When the affected roots begin to die, they send out new roots, so that the root system becomes bushy and tangled. This root affection is due to a microscopic worm about $^1/_{60}$ to $^1/_{20}$ of an inch (0.4 to 1.25 mm.) long. The best method of control lies in a proper system of rotation.

Root Rot. The first indication is a sudden wilting followed by the death of the plant in most cases. This disease is attributed to the work of a parasitic fungus which lives in the ground. Deep ploughing together with a proper system of rotation seems to be the only adequate means of control.

The *Areolate mildew* is due to a fungus, *Ramularia areola.* The *Cotton Leaf Blight* is due to the fungus *Cecrospora Gossypina.*

311 J. A. HONING. **Cause of the "Slijmziekte" of Tobacco and the Means for Controlling it.** (De Oorzaak der Slijmziekte en Proeven ter Bestrijding.—*Meded. v. h. Deli-proefstat,* Jaarg. 1, 1910).—*Botanisches Centralblatt,* Bd. 116, p. 47. Jena, No. 2, Jan. 10, 1911.

Sumatra Mr. Honing has been investigating the so-called "Slijmziekte" or tobacco gummosis, a disease which is very prevalent at Medan-Deli, and has found its cause in a bacterium, which locates itself in the roots, stems and veins of the leaves, rendering the tissues mucilaginous.

Mr. Honing succeeded in infecting sound tobacco plants with the isolated bacteria of certain herbaceous plants, such as the *Pouzolzia* (*Urticaceae*), *Ageratum conyzoides* (*Compositae*), *Physalis angulata* (*Solanaceae*) and *Spilantes acmella* (*Compositae*), which were affected with the same disease as the tobacco plant. He is of opinion that the trouble can be much decreased by disinfecting the soil with chloride of lime (bleaching powder) or even with potassium permanganate.

H. JENSEN. **Experiments with Three Tobacco Diseases in the Dutch Indies.** (*Jaarb. Dept.Landb. Nederland, Indie*, 1908, pp. 100-107, pl. 2).— *Experim. Station Record*, Nov. 1910, p. 548. **312**

Dutch Indies: Java

The inoculation of the roots of sound tobacco plants with a solution of the gum or slime from a plant attacked by gummosis, was found to produce this disease in the inoculated roots, but in the case of sound and vigorous plants. the disease rarely extended beyond the area first infected, or to adjacent sound plants. Mr. Jensen is of opinion that the best way of controlling this disease is to encourage the vigorous development of the plants. Experiments with *Phytophthora* incline Mr. Jensen to believe that the spores of this fungus may live in the soil for two years, and may infect tobacco cultivated on such land. By cultures and microscopic examination the black or leaf spot disease of tobacco was shown to be caused by *Cercospora Nicotianae*.

F. C. VON FABER. **Canker of the Coffee Plant Stem.** (De Stamkanker van de Robustaen Quillon-Koffie. *Teysmannia*, XXI, p. 548). — *Botanisches Centralblatt*, Bd. 116. No. 2, p. 46. Jena, 1911. **313**

Dutch Indies

Mr. Faber has discovered a new disease on the *Robusta* and *Quillon* Coffee plants, two species which have recently risen to considerable importance. The trouble has not yet spread to any great extent, but it may become dangerous. It is a kind of canker of the stem, similar in appearance to the disease caused by Nematodes. The stem and roots have a typical discolouration which varies from light brown to black. Microscopic investigation and cultural experiments have brought to light the pathogenic agent. It is a fungus which produces perithecia and pycnidia, and is called by the writer *Ascospora Coffeae* (1).

Attempts to infect the plant were only successful through a lesion of the tissues.

Mr. Faber recommends painting the diseased stems with tar or blue-vitriol solution.

ALB B. **The Enemies of the Tea Plant in the Caucasus.** — *Revue Scientifique*, p. 754-755. Paris, Dec. 10, 1910. **314**

Russian Empire: Caucasus

The cultivation of the tea plant in the Caucasus, although only recently introduced, has already become profitable. A certain number of parasites have begun to invade the plantations. Twelve cryptogams have been observed by Mr. Spiéchneff, one of which, the *Pestalozzia guepini*, causes the "gray disease" of tea, shown by gray spots on the leaves, which are surrounded by a darker line. This fungus is often accompanied by another which causes similar havoc, the *Hendersonia theicola*. Other parasites are the *Discosia Theae* and the *Capnodium Footii*, the latter of which causes the "tea plant soot." Mr. Spiéchneff has described a disease under the name of *Pseudo-commis Theae*, which is characterised by grayish fawn-coloured spots which almost completely cover the leaves. Duconnet and other writers have demonstrated that this disease is not due to parasites.

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(1) Ascomycete, belonging to the *Mycosphaerellaceae*. [*Ed.*]

The gray and the soot diseases also develop on plants with persistant leaves, but the first only attacks the Chinese tea plant (*Thea sinensis*).

Mr. Voronoff has also observed a caterpillar which causes considerable havoc by burrowing galleries into the young tea shoots; this is another enemy that the tea planters will have to fight against.

315 A. E. DE JONGE. **The Canker of Cacao in Surinam.** (*Rec. trav. bot. Néerlandais*, VI, p. 37, 1909, *Bull. 20 Dept. Landb. Suriname*, 1909). — *Botanisches Centralblatt*, Bd. 116, No. 2 p. 48. Jena. 1911.

Surinam

Although not of great importance, this disease sometimes occurs in Surinam. It became epidemic in 1907, when the trees were suffering from a flood. The rusty canker-spots are found on the bark, and generally affect the wood too.

Mrs. de Jonge attributes the disease to a fungus which she calls the *Spicaria colorans*. Under certain conditions it produced fructification of *Fusarium* type, but artificial inoculations met with no success. This fungus is generally accompanied by a *Nectria*, which lives as a saprophyte on the cacao-tree and greatly resembles Zimmermann's *Nectria striatospora*.

The conclusion drawn is that the canker disease in Surinam is the same as that found in the Antilles, Kamerun and Ceylon; but that Howard, Von Faber, and Carruthers have not proved that the *Nectria* is the cause of the evil.

The canker is combated in Surinam by excising the diseased patches.

316 A. E. BARTHE. **The Diseases of Cacao in San Domingo.** (Las enfermedades del Cacao). — *Revistad e Agricultura*, 1910, No. 5, Santo Domingo.

n Domingo

M. Barthe has made a study of *Phytophthora Faberi* (Brown Rot), which attacks the cacao fruit. with reference to the cultivation of this plant in the Republic of St. Domingo, and particularly in the province of Samana. Among the methods suggested by him for combating brown rot is spraying with colophony and sulphate of copper. The writer recommends the growing of both cacao and rubber. (*Hevea brasiliensis and Castilloa elastica*), at the same time, instead of cacao alone. If artificial fertilizers are employed, the soil regains its normal healthy state and is free from the fungi and insects which before had infested it.

Lasiodiplodia Theobroma (die back) on the contrary, attacks branches, roots and fruit. The same methods are employed in combating it as in the case of brown rot, and considering its saprophytic character, the infected parts are cut and burned.

Calonectria flavida, or cacao canker, attacks the trunk and branches, and is eradicated by cutting and afterwards burning the branches, as well as the infected parts of the trunk.

317 P. MAGNUS. **A Rhubarb Disease caused by *Peronospora Jaapiana* in Germany.** (Erkrankung des Rhabarbers durch *Peronospora Jaapiana*. *Berichte der deutsch. bot. Ges.*, XXVIII Jahr., No. 250-253, mit Taf. VII. 1910). — *Botanisches Centralblatt*, B 114, No. 23, XXXI Jahr, No. 49. pp. 595-596. Jena, 1910.

Germany

This is a description of a new species of *Peronospora*, *P. Jaapiana*, Magnus, discovered by Jaap on a plant of *Rheum rhaponticum*, in Trignitz. This fungus produces spots on the leaves, and a partial necrosis of their tissues. It forms conidiophores and no oospores, and its hibernating form is a mycelium, with hyphae richly provided with glycogen. The necrosed parts of the leaves containing the mycelium get easily detached from the rest of the leaf and fall to the ground.

This new fungus is similar to *Peronospora Rumicis*, Corda, and is perhaps identical with the fungus observed by Osterwalder on *R. undulatum* and classified as *P. Polygoni*.

318 L. L. HARTER. **Spinach Troubles at Norfolk, Virginia, U. S. and Improvement of Trucking Soils.** — *Virginia Truck Exp. Station*, Bull. No. 4. Norfolk, August 1910.

United States: Virginia

The diseases of spinach, that are of economic importance in the Norfolk region, are leaf-spot, (*Heterosporium variabile*), mildew, (*Peronospora effusa*) and malnutrition. Malnutrition of spinach, as well as of cabbages and most other crops, is characterized by a general yellowing of the leaves, especially between the veins and around the margins. The lower outer leaves are the first affected. When the disease is bad, the inner and smaller leaves become yellowed. In that condition the plants are unfit for the market.

This disease is a physiological one. A system of soil preparation, culture and fertilization, with a view of affording the best conditions for the development of the plant, should do much towards checking this malady.

319 F. T. BROOKS and A. W. BARTLETT. **Two Diseases of Gooseberries.** (*Ann. Mycol.* 8 1910. N. 2, pp. 167-185). *Experiment Station Record*, pp. 550-551, November 1910.

Great Britain

Attention is called to the death of large numbers of gooseberry bushes in Cambridgeshire. The first indication of trouble is a wilting of the foliage of one or more branches. The attacked branches then die and finally the entire bush. It is claimed that death is due to two distinct fungi, *Botryti. cinerea* and *Cytosporina ribis.*

The external characters of the disease which is due to *Botrytis cinerea* are a wilting and subsequent browning of the leaves on a single branch, usually during the spring and early summer. the innumerable tufts or conidiophores of the fungus burst through the bark at the base of the attacked branches.

These conidiophores arise from large black sclerotia located just outside the cylinder of wood tissue. The dead branches easily break off at the point of union with the main stem. When the branch dies others become affected, so that finally, in a year or two, the entire bush is destroyed. When a branch bearing Botrytis conidiophores is cut transversely a characteristic discolouration of the wood is seen in which the entire wood cylinder, with the exception of a narrow peripheral zone of light colour, is stained a dark gray. Longitudinal sections of the diseased branch show well marked hyphae of Botrytis, ramifying abundantly in pith, wood, and bast, especially in the vessels and medullary rays.

The presence of this fungus in considerable quantities in the vessels checks the transpiration current and thus causes the sudden wilting of the foliage, while its presence in the pith makes its progress either upward or downward easy and rapid. Sclerotia of *B. cinerea* were developed from the diseased wood. The young mycelium of *B. cinerea*, when introduced into a slit in a healthy branch, produced the characteristic wilting of the foliage, and later the conidiophores of the fungus appeared on the inoculated branches. It is claimed that the fungus probably enters through wounds caused by aphides on the tips of the shoots and travels downward; also that injuries due to spring frosts may permit the entrance of the enemy.

In the disease presumably caused by *Cytosporina ribis*, the external symptoms are very similar to those of the Botrytis disease, but the wilting usually occurs in the spring just as the young leaves are unfolding, and bushes killed by its attacks during the winter have a thin growth of white mycelium on the bark at the base of the dead bush or branch. An old scar or unhealed wound was always found near the base of dead branches or bushes. A cross section of the stem at this point showed a brown discoloration of the wood, except over a sector shaped area where the normal light colour was unchanged. At the junction between the healthy and diseased wood is a narrow, dark line.

The bark also is discoloured over a larger area of the stem than that occupied by the infected wood. The discoloured wood extends slightly above and below the wound, and usually both the roots and the upper parts of the stems in recently killed bushes are apparently healthy. Microscopic sections of the discoloured wood show that it is permeated in all directions by fine branching fungus hyphae, noticeably accompanied by a quantity of yellowish brown substance, wound gum, which partially fills up the vessels and occurs plentifully in the wood parenchyma and medullary rays. These hyphae secrete an enzym capable of dissolving lignin, as they are able to bore through lignin tissues, producing a large amount of delignification. This fungus is a wound parasite, and probably its spread from plant to plant is by means of conidia. Since the fungus can live as a saprophyte in dead wood, all gooseberry bushes killed by this disease should be dug up and burned.

Ed. Zacharewicz. **Combined Treatments against Oidium, Grape Mildew and Botrytis.** — *Revue de Viticulture*, No 887, p. 671. Paris, Dec. 15, 1910. **320**

France

The efficacy of these measures was demonstrated during the year 1910, and the growers who made preventive applications completely saved their crop of grapes.

The remedies are applied as follows:

1. Liquid treatment at the beginning of vegetation, the shoots being only a few centimetres in length: treat the plants with a mixture of copper sulphate, 1.5 kg.; soap powder 1.5; kg. water 100 litres. As soon as this dries, make the first application of pure sulphur. Some days later, early in the morning if possible, use the following (by means of a bellows or a sulphur basket): powdered quick lime 70 kg.; sulphosteatite containing 20 % of copper sulphate 30 kg.; this mixture contains 6 per cent of copper sulphate.

2. Liquid treatment some days before blooming, then the second sulphur application, using: sulphur 75 kg.; sulphosteatite at 20 % 25 kg. This mixture (*Soufre sulfaté*) contains 5 % copper sulphate. Some days later, apply the sulphated lime according to the formula indicated above.

3. Liquid treatment towards the beginning of July, third application of sulphated sulphur (*Soufre sulfaté*) that is: sulphur with sulphate of copper, applied at the moment when the grapes begin to change colour, and some days later, third treatment with sulphated lime.

4. Liquid treatment towards the end of August. During the first days of September use the following: burnt gypsum 55 kg.; soap powder 5 kg.; sulphosteatite at 20 %, 40 kg. This gives a sulphated mixture at 8 per cent.

Powder treatments should be mainly directed on the grapes. If the year should be a wet one, repeat the processes.

321 A. PUGLIESE. **Note on the Cultural and Pathological Intensity of the Californian Disease in Vineyards in the District of Cerignola, Apulia, S. Italy.** (Intensità culturale ed intensità patologica della malattia di California nei vigneti dell'Agro di Cerignola).—*Bollettino dell' Arboricoltura italiana*, Anno VI, II-IV trimestre, pp. 106-112, 1910. Naples, 1910.

Italy: Apulia

Basing his conclusions on repeated personal observations, Mr. Pugliese states that the *Californian Disease* tends to pass from the sporadic to the endemic form in the vineyards of the Cerignola region (1).

Its increasing prevalence is, in great part, due to the nature of the soil, and the methods of plantation used in the Apulian vineyards, as well as to the systems of multiplication, cultivation, pruning (Italo-Greek and *ad alberello*) which are generally adopted in the region.

In order to arrest the spread of the disease, the vineyards should be replanted with plants produced from new seeds, and the writer recommends that for this purpose special nurseries should be instituted.

322 L. MONTEMARTINI. **A new Disease of the Olive: *Bacterium Olivae N. Sp.*** Intorno ad una nuova malattia dell'olivo: *Bacterium olivae n. sp.*). — *Atti Ist. Bot. di Pavia*, Series II. vol. XIV, pp. 151-158, 1910.

Italy

This is a description of a new disease of the olive tree, which the writer previously observed in Italy. The cause is a microorganism (*Bacterium olivae n. sp.*) the dimensions of which vary from 2 to 3 μ in length by 0.8 to 1.15 μ in thickness; it is aerobic, and endowed with movement. It dissolves gelatine, producing a greenish yellow pigment which, in old cultures, smells of ammonia.

Attempts to inoculate the disease have been, so far, unsuccessful. As to treatment, it seems to be sufficient to remove all the other leaves and affected parts of the tree.

323 J. B. P. EVANS ***Diplodia Natalensis*: A new Disease of Citrus Fruits.** — (*Transvaal Agr. Jour.* 8 (1910), No 31, pp. 463-465). *Experiment Station Record*, p. 550, Nov. 1910.

South African Union: Natal

A disease of citrus fruits was noticed in Natal in 1900, in which the fruit was light in weight and brownish colored. Accompanying the discolouration was a softening and general translucency of the rind, which at the same time became distinctly sticky. At first it was thought that the disease was due to a mould, but subsequent observations showed that this was not the case, for instead of becoming soft and mouldy, the fruit dried up and the brown discoloration became black. Fruit affected by the disease simply dried out, retaining their original shape and form.

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(1) This disease, which has been observed in California since 1882, and has since spread into various parts of Europe, was attributed to the action of a Myxomycete, *Plasmodiophora californica*, Viala and Sauv. More recent writers, on the contrary, consider it as caused by disturbances of the physiological functions.

See, RAVAZ and ROOS. *La brunissure de la vigne*, Montpellier, Coulet éd., 1905. (*Ed.*)

A study was made of the cause of the disease, and the organism isolated. This proved to be an undescribed species, to which the name *Diplodia natalensis n. sp.* is given.

All varieties of citrus fruit appear to be readily attacked by this fungus, and in addition apples, apricots, and peaches were destroyed by it. if spores were introduced by puncturing the skin. Observations indicate that the infection of the fruit occurs most commonly at the time of picking, when the fungus gains entrance through injuries.

E. S. SALMON. **A Canker of Apple Trees caused by the Brown Rot Fungus.** — (*Gard. Chron.* 3, ser. 47 (1910), No 1221, p. 327). *Experiment Station Record.* p. 548, November 1910. **324**

Attention is called to the development on the branches of apple trees of cankers caused by the brown rot fungus (*Sclerotinia fructigena*). These cankers may be formed either by the mycelium in a mummified apple, which in drying has become glued to the branch, growing from the diseased apple into the branch, or the mycelium may directly invade the wood from the base of a dead fruit spur which has been killed by the fungus.

Great Britain

The chief danger from these brown rot cankers on the wood consists in the possibility of infection the following spring and summer from the numerous tufts of conidia which project from the cankered areas.

G. LUSTNER. **Apple and Pear Mildew: *Podosphaera Leucotricha,*** Ell. and Ev.) **Salm.** = ***Sphaerotheca Mali,* Burr.**—(See page 236 of this Bulletin). **325**

A. MANARESI. **Against the Shrivelling of Peach Leaves.** (Contro l'accartocciamento delle foglie del pesco. Esperienze del 1909 e 1910). — *L'Agricoltura Bolognese*, IV anno, No. 11, pp. 174-178, Bologna. Nov 1910. **326**

Mr. Manaresi describes some experiments made in 1909 and 1910 with the object of comparing the efficacy of sprayings made in the winter with sulpho-calcic mixture, Bordeaux mixture and permanganate of potassium, in order to prevent cryptogamic diseases, especially *Exoascus deformans*, from attacking peach trees.

Italy: Romagna

The experiments were carried out in a peach orchard near Imola (province of Bologna) in the grounds of the Royal High School of Agriculture of Bologna, both on young and full grown trees. The results demonstrate the efficacy of the treatment, before the budding of the peach trees, with anti-cryptogamic substances, particularly with the sulpho-calcic mixture, for controlling *Exoascus deformans*. This treatment gave better results than the cupric mixtures or the permanganate solution.

327 STOYKOWITCH AND BROCQ-ROUSSEAU. **Researches on the Spoiling of Prunes.** — (*Revue gén. Bot.*, XXII, No. 24, pp. 70-79. Paris, 1910); *Botanisches Centralblatt*. Bd. 116. Nr. 1, p. 17. Jena, 3 Januar 1911.

Servia

The process of drying ripe plums, in order to preserve them as prunes, is carried on in the countries where they grow, in various ways which differ in efficacy.

The three most important centres of production are:

a) France (Agen, Tours);
b) The United States;
c) The Balkan States (Servia, Bosnia, Herzegovina).

Prunes from the Balkan States have been taken as types for the study of certain affections to which those of France and the United States are also subject, which may be classified in three groups:

a) White affection attributed to a ferment of the Torula type;
b) Red affection due to a Monilia (1);
c) Those caused by common moulds (*Aspergillus glaucus*, *Penicillium glaucum*, and *Rhizopus nigricans*)

The first is very wide-spread, and the ferment which gives rise to it much reduces the value of prunes. The cause of growth of this ferment is to be sought in defective preparation and its ravages could be reduced to a minimum by simple alterations in the industrial process.

Moulds cause prunes to lose much of their nutritive value, and as damp is a most important factor in the growth of these fungi, a further desiccation is advised, particularly in the case of prunes from Servia and Bosnia, in order to decrease the superfluous quantity of moisture.

328 **Banana Disease in Central America.** — *The Journal of the Jamaica Agricultural Society*, Vol. XII, No. 11, pp. 419-420. Kingston, Nov. 1910.

Central America

Banana Disease, which has spread throughout Central America, causes great damage to the plantations. According to Esser, the actual cause of it would be an *Ustilago* acting together with a *Chytridacea*. In Panama from 15 000 to 20 000 acres were seriously damaged. The same happened in Costa Rica. During the last five years, losses have reached 2 000 000 dollars

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1) Hyphomycete of the family of the Mucedineae. (*Ed.*).

(10 million francs). Neither the condition of the plant, nor the nature of the soil diminishes the virulence of this disease. The United Fruit Company is making experiments with the object of finding a variety of disease-resistant banana.

O. Labroy. **Banana Diseases in Surinam and Central America.** — *Journal d'Agriculture tropicale*, No. 113, p. 328. Paris, 30 Nov. 1910. **329**

Surinam. Central America

For some years the immense banana plantations of Central America have been devastated by a disease called *Panama disease.* It is found in the Panama Canal Zone, in Honduras, Guatemala, Costa Rica, Cuba and Trinidad. In Surinam the losses are enormous. Previously the production of this fruit reached 600 bunches per hectare, whilst now it is only 200 bunches per hectare; this crop does not cover the cost of cultivation.

Doubts still exist as to the nature and origin of the disease, and the conditions favourable to its extension. Dr. Mac Kenny has frequently observed the hyphae of a fungus and traces of a bacterium in the same preparation Mr. E. Smith has come to a like conclusion, and has provisionally called the fungus *Fusarium cubensis*, without affirming that it is solely responsible for the disease. Mr. Cousins has also observed anguillulidae on the trunks of dead bananas.

The malady attacks young and old plantations, but particularly those on dry soil. Young plants become rapidly exhausted and their stems split; in old ones the leaves turn yellow, the whole plant becomes brown and the tissues decompose. The fruit does not ripen and is valueless.

The variety *Gros Michel*, of which the plantations are almost exclusively composed, is very susceptible to this disease. A variety originally from the Congo, and recently introduced, seems quite immune, and is being substituted for *Gros Michel;* it is said to produce 700 bunches per hectare. The Chinese dwarf banana has also been found immune.

The numerous prophylactic or remedial measures which have been tried have not given any really satisfactory results. It is certain, however, that growers should give more thought to choice of soil, rotation of crops, selection of plants, and cultivation.

Independently of the Panama disease, a kind of bee is suspected of having reduced the production of bananas in Surinam in 1909 by 22 %. Strong winds also cause damage to the trees by breaking down plants laden with fruit. Finally another disease, *elephantiasis*. causes the decay of the sheath of the leaves, which gradually wither. This is attributed to a fungus which has not yet been determined.

It is evident that the banana is not, as was previously thought, exempt from enemies and diseases.

330 LESLIE C. COLEMAN. **Diseases of the Areca Palm (*Areca Catechu L.*), Koleroga or Rot Disease.** (With plates VII-IX). — *Annales Mycologici*, Vol. VIII, No. 6, pp. 591-626. Berlin, December 1910.

British India: Mysore

The disease known in Mysore as "Koleroga" (Rot Disease) ruins the plantations of *Areca Catechu L.* situated in the narrow and deep valleys which traverse the high western plateau of Mysore. The geographical distribution coincides with the atmospheric zone where the annual rainfall reaches maxima of 100 to 300 inches (2 500 to 7 500 mm.) and it is during the months when the rainfall is greatest (June-Sept.) that "Koleroga" is prevalent.

A series of minute researches and studies of the disease have given positive results, and show this malady to be caused by an *Oomycete* of the genus *Phytophthora*. The writer gives a long and minute description of the fungus and lays stress upon its great affinity with *Phytophthora omnivora*, De Barry, from which it is only distinguished by the form and size of the oospores. He suggests that, for the present, it should be considered as a variety of the latter, called *Phytophthora omnivora*, De Barry, var. *Arecae*.

The parts of the plant attacked in preference by this Oomycete are the young nuts, which are covered with a thick netting of hyphae embedded in which are usually to be found great number of sporangia. Before the appearance of the mycelium, dark green spots with sharp outlines are seen here and there, which are easily distinguished on the back ground of emerald green The hyphae reach the surface through the openings of the stomata, or else by piercing the outer wall of epidermis cells. In the intercellular spaces of the pericarp, their ramifications are abundant, and they also sometimes extend to the cells, the interior of which they completely obliterate. Some branches of the mycelium penetrate from the surface to the centre of the nut by following the course of the vascular bundles, and they afterwards spread laterally in the tissues still in process of formation, which have large cells with thin walls.

This disease attacks the crown of the palm as well as the fruit; and in this case the infection can be produced in two ways:

1) Directly, by the spores which germinate on the surface of the sheath of the foliage, which is formed like a hood around the extremity of the plant;

2) Or else the mycelium spreads through the stalk of the diseased bunch, ramifies in the trunk, and there rapidly extends to the top of the tree.

The formation of sporangia and the emission of zoospores are greatly influenced by external agents, and above all by light. Sporangia kept in the dark may remain inactive for more than a month; on the contrary, when exposed to light, the zoospores are liberated in from 10 to 15 minutes. Favourable conditions for the spread of this disease are brought about by the rapid alternation at brief intervals of rain and fine weather, which occurs in Mysore from June to September. To protect the plant from the rain, which is the principal agent in the transport of zoospores, the natives of Northern Mysore generally cover the inflorescence with a kind of hood made of the dry leaves of the *Areca*.

More practical and efficacious is the use of Bordeaux mixture, which is applied at the begining of June according to the formula 5 : 5 : 50. It is useful to add an adhesive: 2 lb. of resin; 1 lbs. of washing soda boiled in 1 gallon of water, added to 25 galls. Bordeaux mixture.

R. FARNETI. **The Silver Blight of Oaks as a Danger to Chestnut and Beech trees. Prophylactic Measures for arresting the Infection.** (Il "Mal bianco" delle quercie minaccia anche i castagni ed i faggi. Misure profilattiche da prendersi per limitare od arrestare l'infezione).—*Rivista di Patologia vegetale*, anno IV, No. 16, pp. 241-243. Pavia. November 20, 1910. **331**

Italy: Liguria

Since 1909 the writer has noticed the presence of the Oidium of oak trees on the young buds of chestnut trees cut during the year near Savona, in Liguria. The infection was very limited and, it would seem, without serious consequences.

In 1910 he remarked that in the territory of Lizzano di Belvedere (Bologna) this parasite occurred also in the beech copses cut in the spring of the same year or that preceding. Here the disease, though it had spread but little, showed somewhat grave symptoms.

According to the writer, it is not impossible that the cryptogam of the oak might be also found on the chestnut and the beech, and under favourable conditions might suddenly invade copses of chestnut and beech recently cut.

This new danger from Oidium and the serious damage caused in oak plantations should, according to M. Farneti, attract the attention of the International Institute of Agriculture. This Institute might ascertain whether it be possible to take prophylactic measures to limit or even prevent the spread of the disease wherever it is met with.

As the Oidium of the oak attacks habitually only the new shoots, which appear on plants that have been recently cut or polled the writer thinks the epidemic could be stopped, or even stamped out, by preventing the cutting, clearing, and pruning of oak plantations for a period of from 2 to 3 years.

GRIFFON AND MAUBLANC. **Disease of Chestnut Copses.** — *C. R. Acad. Sc.*, T. 151, No. 24, pp. 1149-1151. Paris, 12 Dec. 1910. **332**

France
Italy
Spain
Portugal

Black-rot (*Maladie de l'encre*, or "ink disease"), which causes such serious damage to chestnut trees, in France, Italy, Spain and Portugal, is generally considered to be due to the parasitic action of a micro-organism on the roots or on the mycorhiza.

From recent researches in Italy by Briosi and Farneti, and in France, in the Limousin, by the writers, it is proved on the contrary, that the cause of this disease is a fungus, *Melanconis perniciosa*. Br. *M. Modonia*, Tub, (Pyrenomycetes), which is of common occurrence in its conidial form of *Coryneum*.

On the youngest branches one often sees elongated patches, very frequently with pointed extremities, and with a raised edge which forms a sort of cushion separating the infected area from the healthy. On all the diseased surface the bark becomes brown and dies; the same applies to the outer layers of wood. The leaves turn yellow and the whole of the extremity of the branch withers when the dead tissue has "ringed" the branch.

In these cases, good results should be obtained by cutting off and burning the infected part. If, on the other hand, one must look for the cause in the microorganisms which attack the mycorhiza, as the majority of investigators affirm, the remedy for this disease is very far from being discovered.

No satisfactory results have hitherto been obtained from experiments in grafting on resisting varieties, nor by injections of carbon disulphide, nor by the use of manures.

333 E MÜNCH. **Defective Formation of the Heart of Beech Trees.** (Ueber krankhafte Kernbildung). — *Naturwissenschaftl. Zeitschrift für Forst- und Landwirtschaft*, 8, J., 12 H., pp. 553-569. Stuttgart, Dez. 1910.

Germany

After a critical examination of the literature on this subject, and after giving an account of the results obtained by experiments on this disease of the beech. M. Munch comes to the conclusion that the decaying of the heart of the beech tree is due to a decomposition process presenting different phases, and is caused by the action of different fungi.

During the first phase the contents of the wood cells become brown, but as the resistance of the wood is not affected, it is still good from a technical standpoint.

During the second phase, the decomposition progresses, the tissue decays and the wood becomes valueless.

Münch's experiments prove that *Stereum purpureum*, *Stereum hirsutum*, and *Schizophyllum commune* are among the fungi which produce decay in the heart of beech trees.

As a preventative remedy, stress is laid on the utility of tarring all cut surfaces and wounds in general.

J. A. OL. **On the Appearance in Russia of a Very Rare Disease in Pines.** (O riedkoi v Rossii gribnoi boliesni kvoi veimutovoi sosni). — *Journal Boliesni Rastenii* (1), No. 4-5, God IV. S. Peterburg, 1910. **334**

Russia

The appearance is noted of *Hypoderma* (*Lophodermium*) *brachysporum*, (Rostr.) Tub. in Russia and particularly in the Government of Poltava (2). According to M. Elenkin, this fungus causes serious damage to *Pinus Strobus* in Trostjaniez Park.

The pine needles attacked by the parasite turn yellow, become covered with blackish spots and then fall, thus causing the death of the tree.

In the appearance and arrangement of the fructifications, *Hypoderma brachysporum* resembles *Lophodermium Pinastri*, Schrad., from which it is distinguished by the thick and short form of its spores.

Further, whilst *Lophodermium* attacks in preference very young trees (up to their 4th year), *Hypoderma* is only found on trees of from 20 to 50 years old. The immediate removal and destruction of infected parts is recommended.

Bordeaux mixture is a good prophylactic.

A. E. VAN HALL-DE JONGE. **Disease of the Leaves of *Hevea* in Surinam.** (Bladziekte in de *Hevea's*. *Bulletin 24 Depart. Land. Suriname*, 1910). — *Botanisches Centralblatt*, Bd. 116, Nr. 2, p. 47. Jena, 10 Januar, 1911. **335**

Surinam

The leaves of the *Hevea*, cultivated in the nurseries of the Botanical Garden of Surinam, suffer from a disease caused by a fungus. As no fructifications were found, the latter could not be determined.

Trees in favourable conditions were very little susceptible to attack.

F. C. VON FABER. **Galls of Cryptogamic Origin on the Roots of *Kickxia Elastica*, Preuss.** (Pilzgallen an Wurzeln von *Kickxia elastica*, Preuss. *Annales Mycologici*, Berlin, 1910, vol. VIII, pp. 449-451). — *Rivista di Patologia vegetale*, anno IV, n. 16, p. 246. Pavia, 20 nov. 1910. **336**

Kamerun

The materials gathered by Mr. Faber during his journey in Kamerun included some germinating plants of *Kickxia elastica* (1). They exhibited small galls on their roots which caused their decay in the nurseries.

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(1) The *Journal Boliesni Rastenii* (Journal of plant diseases) is the official organ of the Phytopathological Station of St. Petersburg. It contains:

a) Original articles accompanied by bibliographical notices, which give a clear idea of the current literature dealing with the subject, with special reference to Russia;

b) Notices of the appearance of diseases in different parts of the Empire with information concerning their virulence, the plants attacked and the remedies to be used, etc.;

c) The organisation of the control of these diseases by means of official bye-laws containing practical advice to agriculturists. [*Ed.*].

(2) *Hypoderma* (*Lophodermium*) *brachysporum*, (Rostr) Tub. belongs to the family of the Hypodermataceae. It was discovered by Rostrup in Denmark and by von Tubeuf in Germany. [*Ed.*]

Anatomical and cytological researches have proved that the formation of galls is due to the increase and hypertrophy of the cells of the bark which also become polynucleate.

The pathogenic agent is the mycelium of a fungus not yet identified through want of acquaintance with its organs of fructification. Absence of fresh material has prevented artificial cultures being made. Probably the fungus acts on the young plant by the secretion of an irritant poison.

Phanerogamous Parasites and Weeds. — Their Control.

337 O. GERTZ. **Physiological Studies of Dodder (*Cuscuta*).** (*Bot. Notiser*, 1910, No. 2, pp. 65-80; 3, pp. 97-136). — *Experiment Station Record*, Nov. 1910, p. 528.

United States

The main purpose of the investigation was to study the conditions of the formation of haustoria in cuscuta. The effect of radium emanations on the twining motion and on the formation of haustoria was also studied, the results showing that both these processes were completely checked by the emanations.

A full bibliography of the subject is given in this paper.

338 G. LOTRIONTE. **Protecting Beans against Broomrape (*Orobanche*).** (Contro l'orobanche). — *Giornale di Agricoltura della Domenica*. Piacenza, 20 november 1910, p. 429.

Italy

The Italian Minister of Agriculture has invited the directors of the experiment fields for the indirect manuring of wheat to try Lotrionte's method of combating Broomrape (*Orobanche*), a weed so especially harmful to horse-beans and to other crops.

Lotrionte's method is based on his observing that deep planting of beans is an obstacle to the development of the weed; it can be summed up as follows:

Sow the beans as early as possible (with the first September rains, never after the end of October) so that the plants may have taken root before winter, and have a strong deep tap root by the spring. Plough furrows at a distance of 40-60 cm. from each other, and at a depth of 18-22 cm.; the more fertile and better manured the soil, the greater must be the interval. Place the beans in the furrow, throwing earth on them at once, so as to cover them to a depth of 6 cm. The furrows disappear through the action of autumn and winter rains, of hoeing (which usually takes place in May) and of spring weeding.

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(1) Rubber-producing Apocynacea of tropical Africa [*Ed.*]

Where there are small stones, or the soil is too hard, or other obstacles prevent the furrow being sufficiently deep, beans should not be sown, as the plants in this case become a prey to the parasite.

Use chemical fertilisers: 5 to 6 quintals of superphosphate per hectare and 3 to 4 quintals of plaster in volcanic soils; superphosphate and plaster in the above quantity but with the addition of 1 quintal of sulphate of potassium in light soils.

The beans should be sown, as has already been stated, at a depth of from 18 to 22 cm. In light soils a depth of 20 to 24 cm. can be tried; in heavy soils 15 to 18 cm. (1).

Insects and other noxious Invertebrates: Their Biology and Control.

Combating Insect Pests in British India. — *Report on the Administration of the Department of Agriculture of the United Provinces of Agra and Oudh.* Allahabad, 1910, p. 6. **339**

British India

The Department of Agriculture of the United Provinces of Agra and Oudh is not yet in a position to deal effectively with any large proportion of the insect pests of the province. Continued efforts have been made to check the locusts (*Hieroglyphus furcifer*) which have been doing serious injury to sugarcane in the eastern districts, especially in Azamgarh. Improvement is reported from the areas dealt with in previous years, but the treatment recommended (digging the cane-stubbles in the hot weather) has been found difficult to organise, for the reason that the cultivators (who are not in a position to hire much labour) are very busy in nursing the young sugarcane through the dry months, and cannot always spare time from hoeing and irrigating to dig the stubbles effectively. An attempt will be made in the current year to secure organised action on the part of the larger estates on which the pest is found.

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(1) E. De Cillis, Professor at the Royal Superior School of Agriculture at Portici, has repeated G. Lotrionte's experiments with good results. He found that it is essential to sow deeply, *but in an open furrow*, for if the furrow is covered, the experiment completely fails. *L'Agricoltura Salentina*, Lecce, ott. 1910, n. 10, p. 311. [*Ed.*].

In the central circle, which at present is the only one with a trained entomological assistant, demonstrations have been given of spraying for the mustard aphis (*Aphis Brassicae*), and "bagging" the rice bug (*Leptocorisa varicornis*).

340 F. PICARD **The Number of Generations in Cochylis.** — *Progrès agricole et viticole*, No. 51, p. 758. Montpellier, déc. 18, 1910.

France

In connection with the alleged appearance of a third generation of Cochylis during the year 1910, M. Picard explains that, amongst insects which pass the winter in the nymph state, it occasionally happens that some individuals, placed in more favourable conditions than usual, are transformed into adults more rapidly than the others. These adults which are hatched prematurely may remain in the cocoon until the spring, or may come out in the autumn or winter. In these cases, however, the process *is nothing but the acceleration of the metamorphosis and is not a further generation.* The so-called third generation is therefore only a part of the first generation of the following year, and nothing else. This premature metamorphosis is fatal to the insect, which dies before having laid its eggs.

341 PIETRO VOGLINO. **The Parasites of *Mytilaspis Pomorum.*** — *I nemici del pioppo canadense di Santena.* Turin, 1910, in-8°, p. 115.

Italy: Piedmont

In addition to *Emisarcoptes coccisugus*, already mentioned as a parasite of *Mytilaspis pomorum*, there is also an Acarus, *Fremeus minimus*, which destroys the eggs and larvae. The *Hymenoptera*, however, are more numerous, especially *Aphelinus mytilaspis*, already found by Howard in North America, *Habrolepis Zetterstedti*, *Encyrtus sp.* and *Physcus sp.*

These parasites of *Mitilaspis Pomorum* are prevalent in various parts of Piedmont, where they have already checked its multiplication.

Although in some districts where the presence of *Mitilaspis Pomorum* is likely to cause much damage, a species of Acarus hostile to this parasite does exist, the extension of the Acarus is as yet very limited.

While it is true that much attention was paid to winter scraping, and the plants were sprayed with emulsions of heavy oil of tar or with tobacco juice, there is no doubt that the various enemies of the parasite were chiefly instrumental in its destruction.

Fungus parasites have been found on the *Mytilaspis*, such as, for instance, *Sphaerostilbe coccophila*, *Ophionectria coccicola*, etc.

E. T. Bioletti. **Phylloxera-Resisting Stocks in California.** (Cultivo de la vid en California). — *La Hacienda*, Buffalo, N. Y., Dec. 1910, vol. I, pp. 85-88. **342**

United States: California

After dealing with vine cultivation in the various regions of California, Mr. Bioletti examines the stocks, in order to find out which have shown resistance to phylloxera in California.

The vine most generally used, owing to its resistant qualities, is the *Rupestris St. George*, although there is already a tendency to replace it by the *Riparia gloire*, especially in localities near the coast. In the Great Valley region, the *Jacquez* has been tried, as well as the *Rupestris du Lot*, but whereas the latter has always given excellent results, the *Jacquez* was most unsatisfactory from the point of view of susceptibility to phylloxera. It seems that the natural resistance of the *Jacquez* variety is decreased by the warm climate.

The stocks of the following vines have also been tried: *Riparia Rupestris*, *Aramon*, *Rupestris No. 1*, etc., but no definite judgment can be formed on them yet, the number of experiments made being very small.

The affinity of the Californian vines for the graft-bearers that resist phylloxera has often been shown to be perfect, and the same may be said also for *Flame Tokay* (*Amar bou Amar*), *Petite Sirah, Carignan, Semillon, Colombar*, etc. The grafting of the *Tokay* on the *Rupestris du Lot* gave very good results.

The *Tokay* is a very important grape in California, where it is used as a table grape and also for exportation.

For several years past, certain choice varieties of native or imported vines had been abandoned on account of their limited yield, but it has been found that by grafting these on to resistant varieties, very productive individuals are obtained. This is notably the case with the *Petite Sirah*.

The *Rupestris du Lot* is the variety most suited to the warm climates of the interior, and even to some warm places on the coast. In colder regions, where the soil is more shallow, the *Riparia Gloire* is recommended.

There are several illustrations in the text.

The Protection of Small Birds. — See page 173 of this Bulletin. **343**

344 **Experiments on the Destruction of Insects.** — *Diplomatic and Consular Reports*, No 4554. London, 1910.

Egypt

Messrs. Andres and Maire have been carrying out some interesting experiments for the destruction of such insects as are harmful to cotton and other crops. Cloth bands soaked in a liquid of far-reaching aromatic odour are suspended in kiosks placed in the middle of the fields. In the latest experiments an average of about 1 500 moths per kiosk per night have been caught, including large numbers of the destructive boll worm moths. The preponderance of females was very marked in most of the experiments. The cost is estimated at 15 piastres per *feddan* for all the generations throughout the year (1).

This simple and cheap process deserves serious consideration.

345 V. Vermorel and E. Dantony. **General Principles to be Observed in Drawing up Formulae of Insecticides.** (Des principes généraux qui doivent présider à l'établissement des formules insecticides. — *C. R. Acad. Sc.*, No. 24, pp. 1144-1146. Paris, 12 Déc. 1910.

France

External insecticides, killing by contact alone, are in general of little use, and costly.

The above paper deals with the principles which underlie the manufacture of preparations capable of killing insects by contact, and with the means by which contact can be ensured.

How is it possible to wet the insects? Clairaut has proved that "a body is wet when the cohesion of the molecules of liquid to one another is less than twice their cohesion to the solid. » Bodies of which the liquid molecules have little intercohesion, those with weak superficial tension, should therefore wet the insects.

The question is now reduced to measuring superficial tensions. The tensions of various aqueous solutions of organic substances have been determined, and it has been proved, that alcohols and alkaline salts of the fat series decrease the superficial tension of water the higher their molecular weight, and the greater their proportion in the solution.

Experiments have shown that true superficial tension does not practically intervene without wetting capacity, this wetting capacity can be deduced by static calculations (capillary or stalagnometric).

Two solutions of oleate of sodium of the respective concentrations of 5°/₀ and 1°/₀₀ cause the same capillary ascension, and wet equally well, yet the difference in the true superficial tension of these two solutions is very great.

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(1) The Egyptian *piastre* is equal to 2.46 pence in English money, or 0.26 francs. The *feddan* is equal to 1.03808 English acres, or 59 ares. [*Ed.*].

The writers have also measured the superficial tensions of solutions of Marseilles soap, and of black soap, and having obtained curves comparable to those given by oleate of sodium, they have come to the conclusion that it is unnecessary to employ in the formulae of insecticides so much soap as is usually advised.

Solutions containing 1°/₀₀ of soap wet as well as those containing 5°/₀. It is clear therefore that it is useless to unite in one formula alcohol and soap with the idea of wetting the insects more thoroughly.

L. MOREAU and E. VINET. **Arseniate of Lead in Vine Cultivation and the Consumption of Fresh and Dried Grapes.** (L'arséniate de plomb en viticulture et la consommation des raisins frais et des raisins secs). — *C. R. Acad. Sc.* Paris, Déc. 12, 1910, n. 24, pp. 1147-1148. **346**

France

Although arseniate of lead is gradually eliminated in the process of vegetation when it has been spread over the bunches just before they flower, it is yet found in the grapes when they are gathered. Messrs. Moreau and Vinet have made tests to find out the proportion of the insecticide that remains on the stalks and the berries, particularly at the vintage, according to whether the plant was treated before or after flowering. The following results are given:

1) *Grapes treated before flowering*: Some considerable time before the vintage, only a small quantity of the poison was found on the grapes, and this was undoubtedly due to a certain amount of the arseniate of lead, washed down by the rain, having remained on the stalks or the pad (*bourrelet*) of the grape itself when the berries are picked. *No arseniate of lead was found* on the grapes at the time of vintage, and these could therefore be consumed without danger.

2) *Grapes treated some time after flowering.* Under these conditions the stalk contains even more poison than the berry.

Although arseniate of lead is easily eliminated from the berries, *there may still be some remaining on them at the time of the vintage.* This fact alone is sufficient to show the danger of eating grapes which have been treated with this insecticide at a late period.

3) If traces of arseniate of lead are found on dried grapes which have been treated before the flowering, this must be due to contact of the stalks with the berries during the drying process and the different manipulations to which the raisins have been submitted.

347 TRUELLE. **Efficacy of Glass Traps for the Capture of Insects.** (L'efficacité des verres-piéges pour la capture des insectes). -- *Revue Générale Agronomique.* Bruxelles, Oct. 1910.

Austria

Last year, at the instigation of the Imperial and Royal Station of Vienna for the Protection of Plants, a number of glass traps (system Brossart) and others of a similar kind, were installed at the High School of Arboriculture and Horticulture at Eisgrub.

All the insects captured during the first month were counted and determined, but afterwards only the Hymenoptera and Lepidoptera were collected; the Diptera were omitted. Though the glass-traps made a large number of captives, they did not prove sufficiently effective in catching butterflies and moths, for less than 7.5 % of harmful Lepidoptera were taken by their means. The number of Coleoptera, Hemiptera and Neuroptera was relatively small.

Three kinds of glasses were used: Brossart glasses, little evaporation glasses, depth 12 cm., diameter 45 mm., and white medicine phials with a 15 to 18 mm. aperture. The first of these were most successful in the capture of hornets and wasps.

Regarding the different liquids used to attract the insects, the best results were obtained with beer and alcohol at 15°. sweetened with 50 gr. of syrup per litre and perfumed with methyl acetate.

348 G. LÜSTNER. **Lime-Washing in Controlling Fruit Tree Pests.** (Ueber den Wert des Kalkanstriches fur die Bekämpfung der Obstbaumschädlinge). — *Geisenheimer Mitteilungen über Obst- und Gartenbau,* N. 1, pp. 5-7. Jan., 1911.

Germany

As a measure against the enemies of fruit trees, limewashing is deemed by some growers to be very efficacious, and is practised by them periodically, by others the process is considered useless, and is therefore omitted.

The experiments of Vill have demonstrated that this limewashing is of great use as a remedy against Cockchafers (*Melolontha vulgaris*), snails, etc. The use of lime also frees the trees from injurious mosses, lichens, algae, etc., and protects them from early frost. The white colour given to the trunk of the trees also prevents undue heating through the action of the solar rays, thus prolonging their period of rest.

But the whitewashing has no effect upon scale-insects, especially upon *Diaspis oetraeformis*, which has caused serious damage to fruit trees in the Rhine district.

Experiments have been made on the action of lime-wash on the eggs of two Lepidoptera: *Gastropacha neustria* and *Ocneria dispar.* The dipping of clusters of these eggs in whitewash containing 10 %, 15 % and even up to 60 % of lime in no case caused their destruction, a possible delay of some days only being observed in their hatching.

Insects noxious to special Crops.

349 Japan

F. G. **Krauss. Insects and Fungus Diseases Affecting Rice.** (See page 206 of this Bulletin).

350 United States

S. A. **Knapp. Cotton Weevils in the United States.** Demonstration Work on Southern Farm. — *U. S. Dept. of Agr. Farmer's Bull.* 422, pp. 3-19. Washington, 12 Nov. 1910.

Success in obtaining a crop of cotton under Boll-weevil conditions is based on three principles. It has been observed that the number of weevils could be so reduced that they could not cause complete destruction until the first and middle crops were entirely out of danger; that the cotton plant can be so bred and selected, as to throw nearly its whole life forces into the first and middle crops, and finally maturity could be so much hastened by cultivation, that most of the bolls would be developed to the safety point before the weevils grew too numerous.

To obtain these results, the following instructions should be followed:

1) Where there is no cover crop, do some shallow winter cultivation of the soil.

2) Plant as soon as the season permits without danger to the crop.

3) Plant varieties of cotton which mature early. This method is not only important inasmuch as it helps to ensure a crop, but also because it is a means of getting rid of weevils; cotton which ripens early can in fact be harvested and the green pods destroyed, before the weevils take up their winter quarters. If all planters followed this method, the damage caused by these pests would be greatly decreased.

4) Use fertilising materials, particularly acid phosphate (superphosphate) and potash, to hasten maturity and increase production.

5) Leave more space between the rows, and on ordinary uplands have a greater distance between plants in the row than is usual. In rich soils, or those well manured, it is preferable to plant closely, to avoid an excessive growth of stalks.

6) Harrow before and after planting and on the young cotton.

7) Agitate the stalks with a brush attached to the cultivator.

8) Where practicable pick up and burn the squares (unblown flower-buds) which fall.

9) Sow selected seeds of the best varieties.

10) Rotate the crops with leguminosae.

It will be noted that this system has a twofold object: to decrease the number of weevils, and to hasten the maturity of the cotton, so as to obtain a crop before the advance of the beetles.

351 Enemies of Kapok.—*The Tropical Agriculturist.* Colombo, Dec. 1910, p. 501-503.

Java

As yet, Kapok in Java suffers little from diseases or attacks by insects. The most troublesome pest is the insect *Batcoera hector*, which can kill the trees, but is fortunately rare. The best way to fight this insect is, as soon as one sees the holes in the trees, to try to catch it with a bit of wire, or if this cannot be done, to put a small quantity of benzine in the hole and seal it up with clay.

Sometimes the fruit is attacked by another insect, *Earias Fabia*, but this is more common in cotton. Also a red and black bug, *Dysdercus cingulatus*, sometimes attacks the fruit. *Helopeltis* but rarely damages the Kapok leaves. Occasionally damage is done by a parasite (*Jad. posilan*, a *Loranthacea*), which infests the branches and causes them to die.

The greatest damage to Kapok is done by bats, which are very fond of the young fruit when it is still fresh.

352 The Fight against Froghoppers, *Tomaspis*, attacking the Sugar Cane. – *Department of Agriculture, Trinidad. Special Bulletin (Annual)*, p. 7. Port-of-Spain, 1910.

Trinidad

During 1910, experiments were made by the Department of Agriculture of Trinidad to ascertain the chemical substance best suited for the destruction of froghoppers (*Tomaspis*). It was found that solutions of insecticides in water were of little use, but the smallest quantity of kerosene oil readily penetrated the wings and thus paralysed the froghoppers. In order to dilute the kerosene to a workable strength, experiments were made with the object of obtaining a more easily prepared emulsion than the ordinary soap-kerosene emulsion. The following formula has given satisfactory re-

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(1) The Kapok of Java is the *Eriodendron anfractuosum*; in Brazil Kapok is produced from the fruit of various plants locally called *paneiras*. (J. Ç. Oakenfull. *Brazil in 1910*. Devonport, 1910, p. 121).
See also: G. Watt., *The Economic Products of India*. [*Ed.*].

sults: kerosene, 6 vols; lysol 2 vols; mix and add to this water, 100 vols. No heating is required. This solution kills the adult froghopper but not quite so readily as the ordinary mechanical mixture of kerosene and water. In the absence of the special spraying apparatus for the latter, the lysol emulsion could be used. The expense of spraying is considerable.

In the trials of trapping froghoppers by means of lights, 624 000 were caught between July and October. Of this number 429 000 were caught in September.

The application, on a very limited scale, of manures to stimulate the root growth of the affected canes was fairly successful in the case of calcium cyanamide.

The removal of the heaps of rubbish under which the continued moisture enabled the immature insect to develop in large numbers was tried, and with good results.

Carbon-disulphide was injected into the soil around the cane stools attacked by grubs; but, owing to the adhesiveness of the clay soils when wet, the vapour could not penetrate them, and it was an entire failure.

The Control of *Castnia Licus*, an Enemy of the Sugar Cane. — *Department of Agriculture, Trinidad. Special Bulletin (Annual)*, p. 7. Port of Spain, 1910. **353**

Trinidad

The moth borer, *Castnia Licus*, has continued its ravages on one or two estates, and on one estate 188 874 were caught from January to December 1909. In 1910, from January to June, 36 914 were caught as compared with 91 684 for the corresponding months in 1909. The reduction therefore was considerable. Every effort is being made to exterminate these pests, catching them with nets has been found the most successful so far.

J. L. Guppy. ***Steirastoma depressum*, L., Cacao Borer Beetle.** — *Department of Agriculture, Trinidad. Bull.* October 1910. Vol. IX, No. 66, pp. 186-190. **354**

Trinidad

For many years this beetle has been a serious pest in Trinidad. Besides Cacao, *Chataigne maron* (wild chestnut) and the freshly cut bark of the silk cotton tree *Bombax* are damaged by it. Cacao pods are occasionally attacked. That the beetles have to do with the spread of canker and kindred diseases seems probable, as they feed alike on the bark of healthy and unhealthy trees.

The life-history of this pest was studied by the writer. The various stages in its life cycle are as follows: Period of incubation of egg 5 days; length of time during which the grub tunnels (shortest period) 60 days; pupa or chrysalid stage 12 days; total, a little over 2 ¹/₂ months. This period is often extended to 3 or 4 months.

The methods recommended for its control are as follows.

In badly attacked areas it is advisable to spray alternate rows of trees, and tar at the crutch in the intermediate rows, this will have the effect of driving the beetles from the tarred trees to those that are sprayed.

The use of traps is recommended in all cases. For this purpose, heaps of freshly cut chestnut branches and the bark of the silk cotton tree should be used. All dead wood must be removed and burnt. There must be a systematic search for both worms and beetles, especially during dry sunny weather. In spraying with arseniate of lead, from 5 to 6 lbs. should be used to 50 gallons of water (0.99 to 1.2 kgs. per hectolitre).

355 A. NAUMANN. **The Enemies of the Rhododendron.** (Einiges über *Rhododendron* Schädlinge).—*Jahresber. des Vereins für angew. Botanik*, 1909, pp. 171-188, with 1 Fig. Berlin, 1910). *Rivista di Patologia vegetale*, anno IV. N. 17, p. 260. Pavia, Nov, 30, 1910.

Germany

A description of several vegetable and animal parasites of the Rhododendron and the Azalea:

1) *Aleurodes vaporariorum*, West.. for the control of which is recommended immersion in a solution of soft soap and insect powder (500 gr. of soap, 12 gr. of powder and 15 litres of water).

2) *Acalla schalleriana*, F. S. var. *azaleana*, n. var.

3) *Otiorhynchus sulcatus* Fabr. against which an emulsion of carbon disulphide was used with success.

4) *Physalospora Rhododendri, n. sp.*, *Exobasidium sp.* and *Septoria Azaleae.*

356 G. LÜSTNER. **Some new Enemies of Fruit Trees.** (Einige neue Obstbaumfeinde. — *Jahresb. d. Vereins f. angewandte Botanik.* Berlin, 1909, pp. 93-111, with 6 engravings). *Rivista di Patologia vegetale*; anno IV, N. 16, p. 249. Pavia, Nov. 1910.

Germany

A description of four parasites of fruit trees, three of which are animal and one vegetable:

1) *Diaspis Pyri*, Boisd., which attacks pear trees, peach, apple and plum trees, etc., causing depressions on the branches, which sometimes reduce them to the thickness of a ribbon.

This scale insect is controlled by coating the branches with carbolineum, care being taken, however, not to touch the buds, which would be injured by this.

2) *Tarsonemus Fragariae*, Zinn, an Acarus which attacks strawberry plants, causing them to wither and preventing the leaves from growing. As it is chiefly the young leaves which are attacked, it is difficult to find an insecticide which does not do more harm than good.

3) *Eriophyes Ribis*, Nal., injures the leaves of currant and gooseberry bushes. The best treatment is to cut and burn the parts infected with this Arachnid, and better still to spray the plants with a mixture of sulphur and lime (1 part of lime to 2 parts of sulphur).

4) *Podosphaera leucotricha*, (Ell. and Ev.) Salm. (*Sphaerotheca Mali*, Burr.) The best way to control this Ascomycete, commonly known under the name of pear and apple " mildew, " sulphur sprayings and sprinkling with carbon disulphide having been tried without success, is to gather and destroy all infected branches. An efficacious prophylactic measure, if used towards the end of winter, is according to Erikson, the painting of the branches with Bordeaux Mixture.

D. WARTH. **Control of *Cochylis Ambiguella*.** (Bekämpfung des Sauerwurms). (Wurtembergische Weinbau Verein. — *Bericht über die Sitzung des Vereinsausschusses vom 18 November 1910*). *Der Weinbau*. Heilbronn, Dez. 1910. **357**

The *Wurtembergische Weinbau Verein* voted, at its sitting of Nov. 18th, a resolution proposing the adoption by the Government of the following measures, against *Cochyllis ambiguella*, or grape worm: **Germany**

a) The proprietors of vineyards should carefully attend to the scraping and cleaning of the vine-stocks every year, either at the close of the vintage, on at any rate, not later than the pruning season (spring);

b) The vine-props should be well cleaned every year, so as to destroy all the *Cochylis* chrysalid. The props should have the bark taken off before they are used in vineyards;

c) The bands of rush, straw, or raphia should be collected and burnt every year, and replaced by new ones;

d) The discarded props, and also cut vine-shoots, should be taken far away from the vineyard each year before May 1st, instead of being piled up near;

e) After, and during the vintage, all berries and bunches attacked by this grub should to be collected and destroyed.

J. B. HARRISON and F. A. STOCKDALE. **Invasion of *Chionaspis Citri* in the Lime Plantations of British Guiana.** (Pests and Diseases. Scale Insects).— *The Journal of the Board of Agriculture of British Guiana*. Vol. IV, N. 2, p. 93. Demerara, October, 1910. **358**

The *Chionaspis citri* (orange snow scale) has invaded some lime plantations in British Guiana, being found mostly on the heavier lands, and almost always on the trunks and thick branches of trees. **British Guiana**

The best remedy is to paint the parts affected with resin compounds.

359 G. DEL GUERCIO. **The *Phlaeotribus Oleae* of Olive Trees in Liguria. New method of Control.** (Il Fleotripide dell'olivo in Liguria ed i nuovi mezzi per combatterlo. Porto Maurizio, 1910, 12 pp.). — *Rivista di Patologia vegetale*, anno IV, No. 16, pp. 251-252. Pavia, 20 Nov. 1910.

Italy: Liguria

Phlaeotribus oleae is a little insect belonging to the group of Thysanopterae. The female lays her eggs in the holes bored in the wood by weevils (1) whence afterwards the adult insects spread over the leaves and young buds of the olive, damaging them and preventing their development.

This insect breeds twice a year. The disease known as *schima* has spread in Liguria of late years in such an alarming manner that a special entomological laboratory has been opened in Villatalla under the direction of Mr. Del Guercio.

Efficacious means of combating the malady are as follows: Spraying with tobacco, cutting and general pruning, to be done in winter time, beginning with branches of a thumb's thickness; gathering and destruction of the infected leaves.

This insect has a natural enemy in a Chalcidida, *Eulophus Gentilei.*

360 H. M. RUSSELL. **The Pecan Cigar Case-Bearer. *Coleophora caryaefoliella.*** — *U. S. Dept. of Agr. Bur. of Entomology*, Bull. No. 64, Part X, pp. 79-86. Washington, Nov. 12, 1910.

United States: Florida Kentucky

The Lepidopter *Coleophora caryaefoliella*, Clem. ruins the plantations of Pecan (*Hicoria Pecan*, Britt.) in different parts of the United States, especially Florida and Kentucky (2). The larvae make their appearance in spring, by attacking the leaves they cause them to shrivel up; they also penetrate into the shoots and devour the young tissues.

The *Coleophora* is also found on *Cornus Mas, Corylus* and *Prunus americana.*

The use of arseniate of lead (3 lbs to 50 gallons of water), during the month of March, is recommended. Lime-sulphur mixture applied during the dormant season would certainly give good results.

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(1) *Calandra sp.* (*Ed.*).

(2) The *Hicoria Pecan*, Britt = *Cayra olivaeformis*, Nutt. an American Juglandacea, is a tree much cultivated on account of its rapid growth and fruitfulness. Pecan nuts are considered among the best kinds of edible nuts. [*Ed.*].

Other pests.

The Destruction of Rats. Board of Agriculture and Fisheries. — *Leaflet*, No. 244. London, Dec. 1910. 361

Great Britain and Ireland

With the object of reducing, and, if possible, preventing the enormous damage caused by *Mus rattus* and *Mus decumanus*. Rat Clubs have been formed by land-owners and farmers for the destruction of rats. Rewards are offered to anyone killing a certain number of these animals. The modes of destruction commonly used are three: hunting, trapping and poisoning.

Besides phosphorus, arsenic and strychnine, carbonate of barium is advised. This substance, on account of its corrosive action on the mucous membrane of the stomach, produces a burning thirst, which induces the rats to seek water in the open where they die. Rat viruses, or cultures of a microbe producing a specific disease of rats, have been of but little use, as if only slightly infected, the rodents recover, and afterwards are more or less immune.

Combined efforts ought to be made over a wide area. Rat hunts should be organised simultaneously on the circumference of a circle, traps and poison laid on the outside, and food supplies in the centre to which the rats should be driven; the rats must be prevented from escaping outwards, and their holes, runs, and nests destroyed as the circle is drawn closer. When a broad band at the circumference has been cleared, poisoned food should be used in the centre, and virus laid where the rats can take the disease.

D. Donon. **Experiments on the Destruction of Field Mice in France.** — *Revue Agricole, Viticole et Horticole*, 8^e^ Année, No. 95, pp. 265-268. Villefranche, Nov. 1910. 362

France

The extremely rapid increase of field mice has been noted on every side. Throughout Beauce, meadows have particularly suffered from the ravages of these rodents which attack both cereals and other cultivated plants.

On the 2nd March, 1910, the Commune of Artenay made comparative experiments with the following substances: 1st. phosphor paste of L. Steiner; 2nd. arsenious acid; 3rd. Danysz Virus.

1st) *The efficacy of L. Steiner's paste* (of which the writer does not give the composition) is indisputable. Three days after its application, all the field mice were destroyed. The cost per hectare for destruction by this means is as follows:

Steiner paste	8.00 Frs.
Bait	2.50 »
Labour	5.00
Total	15.50 Frs.

The handling of phosphorous paste is not devoid of danger.

2nd) *Use of arsenious acid.* — This poison has been used according to the following formula:

Wheat 10 kgs.; molasses 1 kg.; coloured arsenious acid 1.500 kg., flour 0 500 kg.; essence of aniseed, a few grams.

With this treatment, after 10 days, only 50 % to 60 % of the field mice were destroyed, and the cost per hectare can be stated as follows:

Wheat 10 kgs.	2.40 Frs.
Molasses 1 kg.	0.40
Arsenious acid 1.500 kg.	1.50
Flour 0.500 kg.	0.20 »
Labour	3.00 »
Total	7.50 Frs.

3rd) *Experiment with Danysz Virus.* — This was made under the direction of Mr. Danysz, Head of the Pasteur Institute. To treat 5 hectares of purple clover (*Trifolium incarnatum*), five bottles of virus were diluted with 15 litres of water; to this 80 gr. of kitchen salt were added. This is enough to moisten 50 kgs. of bruised oats. For one hectare, one bottle of virus, three litres of water, and from 15 to 20 gr. of kitchen salt should be used. The grain moistened with virus must remain heaped from 3 to 4 hours, so that it may become thoroughly impregnated. One half of the bait prepared as above was used for 2 $^1/_2$ hectares, to the other half, 30 gr. of carbonate of barium (which increases the virulence of the bacillus) were added. In the plot treated with virus to which no carbonate of barium was added, 85 % of the field-mice were killed; where the salt of barium had been added, not a living field-mouse was discovered.

The expense incurred in the use of this process, for one hectare of cultivated soil infested with field mice, was:

Bruised oats 10 kgs.	1.80 Frs.
Virus, 1 bottle	1.70 »
Carbonate of barium 20 grs.	0.05 »
Labour	2.50 »
Total	6.05 Frs.

Considering that wheat and hay crops are actually preserved by these means, it will be seen that the cost is not excessive.

SOUTHERN CROSS. **Devastation by Rats of Sugar Plantations in Queensland, Australia.** — *The Louisiana Planter and Sugar Manufacturer*, Vol. XLV, No. 26, pp. 409-910. New Orleans, Dec. 24th, 1910. **363**

Australia: Queensland

Much damage has been recently done to sugar plantations in Queensland, by rats, especially along water-courses and in places where there is much grass and under growth. The sweetest varieties of cane are the most attacked. The rats gnaw the stalk through and the cane falls and becomes useless.

There has been a loss of from 300 to 400 tons of cane in one plantation. Definite measures have not yet been adopted to combat this new pest.

G. F. PETRIE. **Rats and Plague.** — *Nature*, N° 2140, Nov. 3, 1910, p. 16. **364**

British India Great Britain

In India the rat flea, *Leomopsylla cheopis*, which closely resembles the human flea, *Pulex irritans*, is by far the commonest species infesting rats. In England the common rat flea is *Ceratophyllus fasciatus*; a single specimen only of *Leomopsylla cheopis* has been found up to the present time.

Leomopsylla cheopis, especially if hungry, will bite man; *Ceratophyllus fasciatus* does not take to man with any readiness, but will undoubtedly bite on occasion. This difference in the appetite of the two species for human blood may be of significance in determining the likelihood of the spread of rat plague to human beings.

V. V. TALANOV. **Iujury by Slugs to Fields and Gardens in the Govt. of Moscow, Russia.** (Goliie slisni, Ulitki povrexdaiustciie polia i ogorodi v Moscovskoi Gub. Iod. Moskovskago Gub. Semstva. Moskva, 1910). — *Xurnal Opitnoi Agronomii* God XI. 'Kniga 5, pp. 745-746. S. Petersburg, 1910. **365**

Russia. Moscow Gvt

Agriolimax agrestis and *A. laevis* (*Limacidae*; *Arion Bourguignati* and *Arion subfuscus* (*Arionidae*) have caused great damage in the Province of Moscow where they devour cultivated plants, including winter corn, which was thought to be secure from their attacks.

The most effectual methods of combating them may be divided into three groups:

1) *Preventive Measures:* The removal of stones which form retreats for slugs during the day; early sowing; the substitution of rye for other cereals; treatment of seeds with poisonous solutions, or with substances having a very strong smell, as kerosene.

2) The leaves of cabbages or other vegetables should be scattered in kitchen gardens; the slugs will collect in great numbers on these leaves, when it will be an easy matter to destroy them.

3) Spraying with mixtures containing iron or copper in the evening, or in the morning before the sun rises, when the weather is fine and dry.

Good results can also be obtained by spreading common salt on the fields in the proportion of 3 lbs. per déssiatine (1).

366 Plant Pests in Tobago, during the Years 1909-1910. - *Department of Agriculture*, Trinidad, Special Bull. (Annual), pp. 21-22. Port-of-Spain, 1910.

Tobago

The chief plant pests in Tobago are as follows:

Vegetable Parasites: Black Blight; Bird vine, which is responsible for the death of large numbers of fruit and other valuable trees; the most common species of Bird vine seems to be *Pthirusa Seitzii*; Love vine (*Cuscuta americana*), which is controlled by law.

Noxious Animals: Parasol Ants, in Tobago known as *Red Ants*. They are killed with carbon disulphide (2).

Rats. Small and large cacao pods are bitten, gnawed and destroyed by them. It is a great mistake to kill snakes in cacao plantations, as they destroy rats, which are the cacao planter's worst enemy.

Carpenter, or woodpecker, birds. These birds do much good by destroying numberless grubs and the like; on the other hand the harm they do to the ripe cacao pods is very great. The best plan is to destroy a certain number when they become too numerous.

Canker, Black and Brown Pod Rot, Die-back and Root Rot are but little known in the island (3). There is some trouble with coconuts; and as the Gru-gru palm is affected with diseases similar to those of the coconut, and is very plentiful in Tobago, the total destruction of the Gru-gru palm is recommended, when there is any chance of contagion spreading from it to its near ally, the coconut palm.

367 Combating the Tsétsé Fly by Bush Clearing. (Abholzungsversuche im Kampfe gegen die Tsétsé). *Deutsches Kolonialblatt*, pp. 18-19. Berlin, 1 Jan. 1911.

German East Africa

In Usambara, experiments have been made in clearing the bush, with the object of extirpating the Tsétsé fly (*Glossina morsitans*). The cutting down of the underwood destroyed the centres of distribution; nevertheless the tsétsé reappeared as soon as the shrubs grew again. In order to free the road from Kasima to Isikiza of this dangerous insect, two large areas of bush were cleared on either side. Even by burning the underwood in zones measuring 300 metres wide, it was impossible to completely destroy the pest.

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(1) The *dessiatine* is a surface measure equal to 10 924 sq. metres, i. e. a little more than 1 hectare, and equal to 2.699 English acres. [*Ed.*].

(2) These Red Ants are of the genus *Oecodoma*, living in tropical and subtropical America. They attack leaves. [*Ed.*].

(3) *Die-back* is produced by *Diplodia cacaoicola*, Hennings. [*Ed.*].

Legislation for the Protection of Plants.

Order of 1910 of the Board of Agriculture and Fisheries concerning American Gooseberry Mildew in Lincolnshire, England. — Order of 1910. **368**

Great Britain: England

The Board of Agriculture and Fisheries has taken stringent measures to prevent the spread of *Sphaerotheca mors-uvae*, Berk. in Lincolnshire.

No plant may be imported without a special permit from the Authorities. Rigorous rules are in force to prevent the admission of plants in the infected areas and every plant imported must bear a certificate of its healthy condition.

The Inspecting Officers are required to be acquainted with every circumstance regarding time and place of such certificate, and to inspect the packages, stores, plantations, etc.

Anyone impeding the work of these Officers or failing to observe the regulations in force as regards the importation and exportation of plants from the infected district is liable to a fine not exceeding £10.

The order in question came into force on Oct 31st, 1910.

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The information contained in some of the abstracts dealing with Canada has been most kindly placed at our disposal by the Government of that country.

The compilation of these abstracts is the work of Mr. J. K. Doherty, the able chief of the Canadian Bureau, and Correspondent of the International Institute of Agriculture.

AGRICULTURAL INTELLIGENCE.

NB. The Intelligence contained in the present Bulletin has been taken exclusively from the books, periodicals, bulletins, and other publications which have reached the Library of the International Institute of Agriculture in Rome during the months of January, and February, 1911.

The Bureau assumes no responsibility with regard to the opinions and the results of experiments outlined in the Bulletin.

The Editor's notes are marked [Ed.].

Development of Agriculture in Different Countries. — Scientific Institutions. — Education in Agriculture and Forestry. — Experimentation. — Biography. — History of Agriculture.

369 **Improvement of Agriculture and the Agricultural Stations and Societies in Sweden.** — *The Journal of the Board of Agriculture*, N. 11, p. 922. London, February 1911.

Sweden

In Sweden the Societies of Rural Economy are responsible for the agricultural interests of their districts, and are the official representatives of local agriculture. They connect the Government and the farmer in all matters relating to the furthering of agriculture. Their income is derived from the subscriptions of members, from a grant made from the tax on alcoholic liquors, and from State subventions.

The purposes for which these subventions are given are very numerous, but among them may be mentioned the following:

1) *Seed Control Stations.* — There are 17 Stations, which test the purity and germination of seed at certain fixed charges, and give advice to farmers and seed merchants.

2) *Butter Control.* — The butter from each dairy is examined without previous notice three or four times a year, in order to maintain the reputation of Swedish butter abroad.

3) *Chemical Stations for the Analysis of Fertilisers and Feeding Stuffs.* — These are often attached to the Seed Control Stations.

4) *Stations for testing Machines and Implements.* — Two Stations have been established in order to enable new types of machinery to be tested and publicly reported on, either by request of the maker only or by direction of the Committee.

5) *Society for the Cultivation of Marsh and Moor Land.* — This Society maintains an Experiment Station and encourages the rational cultivation of moorland throughout Sweden.

6) *Society for the Improvement of Seeds.* — This Society, the work of which is chiefly centred at the well-known Svalof Seed Station promotes the introduction of improved varieties of farm seeds by means of selection.

7) *Prizes for Small Farms.* – Annual competitions, limited to holdings not exceeding 15 hectares, are organised, all the factors which contribute towards good management being taken into account in awarding the prizes.

8) *Live-Stock Breeding.* — Horse and Cattle-breeding are chiefly encouraged by giving prizes for approved breeding animals. The premiums for cattle are especially intended to encourage breeding among small farmers. The greatest importance is attached to milk-producing qualities, and in judging bulls the characteristics of their offspring and ancestors are taken into account.

On account of insufficient funds, the prizes for cows have in many cases been given up, but small holders are encouraged by the distribution of tickets entitling their cows to service by an approved bull.

These competitions are considered to have a great influence on the improvement of cattle-breeding, particularly by drawing attention to the great importance of employing good bulls.

The Provincial Societies place farmers in the way of purchasing good cattle, and the prizes awarded, together with the service tickets which are paid for by the Committee, make the keeping of a bull a profitable business in many districts.

Some 68 000 of these service-tickets were distributed last year, and the number of animals entered in the competitions was 60 000.

Another method of encouraging cattle-breeding is the approval of so-called breeding centres. These are herds of approved cows which are subject to strict supervision, with a view to building up a strain of heavy-milking cows and distributing their descendants over the district.

9) *Milk-Control Associations.* These are widely distributed in Sweden, the number exceeding 650; through their operations they have improved the average yield of milk and have at the same time led to a more economical and effective method of feeding.

370 **German Colonial Enterprise.** (Deutsche Kolonialwirtschaft). — *Oester. Monatschrift fur den Orient*, XXXVI J., Nr. 12, p. 144. Wien, Dezember 1910.

Germany: Colonies

At a meeting of the German Colonial Committee, at which the Colonial Government was represented, as well as the Department of the Interior, the Department of Commerce and Industry, the Agricultural Council, the Colonial Institute of Hamburg, and the German Industrial Associations, it was decided to carry out, without delay, the following measures concerning German Colonies:

1) New hydrographic surveys in Upper Pangani;
2) Agricultural surveys and experiments in the Ugogo zone;
3) Sending an expert for the cultivation of cotton in Togo;
4) New experiments on the cultivation of kapok;
5) Encouraging the cultivation of rubber in New Guinea;
6) Grants for the cultivation of rice in New Guinea;
7) Foundation of Agricultural Colonial Credit Associations.

The Agriculture in the French Possessions in India and in Oceania. — 371

Bulletin de l'Office Colonial, pp. 18-31. Melun, Jan. 1911.

French Possessions in India and Oceania

India. — Although Pondichery, Karikal, Make and Chandenagor are French possessions, they are economically tributary of British India, to which hey belong geographically. All the exports are agricultural products, but agriculture has not made a step forward since the Colony has been in the possession of France.

New farming implements, fertilisers, etc. are still unknown and a considerable area lies waste which, with the introduction of modern methods might be brought under profitable cultivation.

There is no improvement or recent extension of irrigation.

It is probable that by means of cold storage all the fruits of the country (bananas, guavas, mangoes, cashew nuts) may profitably be exported to European markets (1).

Oceania. — The French Establishments in Oceania consist of the Society Islands, the most important of which are Tahiti and Moorea, besides the Marquezas Islands (Nukhiva and Hivaoa), the Tuamatu Group, the Leeward and other minor groups. The agricultural exports of these Establishments in 1907 attained the value of 5 051 442 fr., a marked increase on former years shows that these colonies are flourishing. Besides the utilisation of the phosphates of Makatéa (Tuamotu Group), this increase also due to a larger exportation of copra in consequence of the more extensive cultivation of the cocoa palm, especially at Tahiti and Moorea, where the production is increasing every day as new plantations come into bearing.

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(1) The Cashew Nut is a product of the *Anacardium occidentale*: "a tree 30 to 40 feet high; originally introduced from South America, now established in the coast forests of India, Chittagong, Tenasserim, and the Andaman Islands, and over South India." Besides the nuts, used as food, the *Anacardium occidentale* produces two distinct kinds of oil, an oil from the kernels, and an oil from the pericarps of the apple, the *Cardole* or *Cashew-apple oil*, of vesicant properties. See: GEORGE WATT, *Economic Products of India*. Calcutta, 1889, vol. I, p. 232. [*Ed.*]

The Tuamotu Islands are also beginning to produce copra again after the cyclone.

372 HITIER. **Canada and the Development of Agriculture in the North West Provinces.** — *Bull. de la Soc. d'Encour. pour l'Industrie Nationale*, T. 115, N. 1, pp. 71-79. Paris, Jan. 1911.

Canada, which is greater in extent than the United States, has an area only slightly inferior to that of Europe, but it is estimated that only 3 to 3 $^1/_2$ million square kilometres, out of a total of 9 331 800 sq. kilom. could be cultivated with advantage. It is the climate, rather than the soil, which is the great natural factor in limiting agricultural production. The immense territories of Canada are generally divided as follows:

Canada

1) an Eastern Zone of wide extent;

2) a Central Zone with an excessive range of temperature of 35° C;

3) a Western Highland Zone, of high mountain chains and table lands;

4) a Maritime Pacific Belt very narrow on the Pacific coast.

From the agricultural point of view, it must be remembered that there is an almost complete lack of intermediate seasons, spring especially being very short.

In crossing from East to West, the different provinces are encountered in the same order in which they were colonised. The maritime Atlantic provinces, Nova Scotia, New Brunswick and Prince Edward Island still have large areas that have never been cleared, but rest of the the country is covered with fine prairies, well cultivated farms and orchards where large quantities of apples are grown and sent to England.

The cultivation of wheat in the province of Quebec has been decreasing for the past twenty years, whereas oats, hay, potatoes, roots and beans have been more extensively grown, so that the farmers have been enabled to keep larger and continually increasing herds of cattle and to extend the dairy industry considerably. A similar transformation has taken place in Ontario, the change in both cases being a consequence of the cultivation of the North-West provinces.

West Canada, which consisted only of two provinces in 1905, and the population of which had doubled from 1901 to 1906 (419 512 inhabitants to 808 863 inhabitants), is now developing with extraordinary rapidity. The whole flood of immigrants invades this vast territory, which is 1 350 000 sq. kilometers in extent, and is considered the most favourable for the cultivation of wheat. The true prairie, which is very easily cleared and is well adapted for cultivation, covers 171 000 000 acres of land "that could be cultivated with profit," according to Mr. Saunders, Director of Agriculture in Canada.

From the administrative point of view, these vast territories include Manitoba, Saskatchewan, and Alberta. The towns of these three provinces are developing in a marvellous fashion: Winnipeg, the capital of Manitoba, numbers about 140 000 inhabitants, whereas in 1871 there were barely 241. To-day Winnipeg is the great centre whence the "incessant flood of emigration passes on to the prairie soil."

By a wide-spread error, the climate of the West of the United States is likened to that of North-West Canada. But if one passes from East to West, keeping at the same latitude, the cold does not begin to be intense in Canada until one reaches the 100th degree of W. Long. In Manitoba the climate is very severe. Further on the soft winds that come from the Pacific across the Rocky Mountains begin to be felt; the mass of the Rocky Mountains here is much less than in the United States.

Wheat cultivation is a great industry in Manitoba, and dairying also has considerably developed during the past few years.

The prairie, practically in a natural state, reaches to the gates of Winnipeg, whilst for long distances it seems as if the sole agricultural industries were pasturage and hay-making. But by the side of the prairies at Portage, Brandon, and towards the West immense extents of wheat stretch on all sides. The ground rises by degrees from Winnipeg across Manitoba, Saskatchewan and Alberta, and after Moosejaw, 64 km. distant from Regina, one sees nothing more of standing crops or ricks, the corn region giving way to that of the cattle ranches. Calgary, at an altitude of 1000 m. in the South of Alberta, is practically the capital.

British Columbia is the "Far West" of Canada. One and a half times the area of France, it contains scarcely 300 000 inhabitants. This part of Canada is one of the finest timber reserves of the whole world, a "sea of mountains" covered with forests, rich in minerals, with some spots of fertile land and prairie. The table lands are well suited for cattle raising, and in the valleys of the Peace and Liard Rivers there are more than two million hectares suitable for the cultivation of cereals.

The concessions of agricultural lands in Manitoba, Alberta and Saskatchewan depend exclusively from the Federal Government; they are all homesteads, and almost all under direct cultivation.

It is stated that the total value of the Canadian crops in 1909 was 2 664 000 000 frs. The area cultivated in oats was the largest of all the cereal areas, being 3 721 000 hectares; after oats came wheat, which is the chief export product of Canada at the present time. The spring varieties are almost the only kind cultivated. Wheat grows to complete maturity in these Northern regions owing to the long bright days.

The Government, anxious to find the varieties of wheat which are best adapted to the special conditions of the North-West Canadian territories, has instituted a special Cereal Division in the Experimental Farms, the specialist at the head of which has to select the old varieties and cross them with others. The wheat most cultivated is the Red Fife variety, and, in certain of the North-Western territories, some of the earlier varieties, amongst them being the cross variety of the Red Fife with a Russian wheat from the neighbourhood of Lake Ladoga, have given excellent results.

The wheats of the North-West are well known for their quality and richness in gluten.

The cultivation of oats and barley is continually extending, and linseed, which is grown simply for the seed, has been gaining in importance for some years past. The Experimental Farms are making every effort to encourage the cultivation of clover.

In the old provinces of the East, all kinds of grains, tubers and forage plants are cultivated, thus permitting the largest possible number of head of cattle to be kept on a given area. Ensilage is practised in all farms, and maize is the plant most frequently cultivated for this purpose, although the so-called Robertson mixture is being more and more used; this in an ensilage of (in weight): Forage maize including the ear, 100 parts, horse beans (*Faba vulgaris equina*) 25 p., sunflower heads (*Helianthus annuus*) 10 p. In order that the desired proportion of each may be obtained, 50 ares are grown in beans and 25 ares in sunflowers to each hectare of maize.

The value of the cattle in Canada was estimated in June 1909 at 2793 million francs. The real centre of the Canadian dairy industry is in the provinces of Quebec and Ontario; the products reached a value of more than 16 million dollars in 1906 in Ontario, whilst in Quebec the total was 14 $^1/_2$ millions dollars. The export value of cheese (the principal milk product exported from Canada) is about 20 million dollars.

The great abundance of fish, especially of salmon, must be counted as a source of great wealth to Canada.

The timber industry is the oldest industry in the country, it being estimated that there are about 350 million hectares of forest. The cultivation of fruit is being greatly extended, especially in the province of Ontario, and thanks to cold storage, apples, and even peaches, reach England from Canada in perfect condition.

Canada's greatest wealth, however, lies in the cultivation of cereals, particularly of wheat. It is with the object of producing wheat that the settlers flock into this immense country of the North-West, barely thought of twenty years ago, and now being cultivated in every direction.

373 **Agricultural Progress in Rio Grande do Sul, Brazil.** (Zur Wirtschaftlichen Lage in Rio Grande do Sul). — *Export*, Berlin, Jan. 26, 1911.

Brazil: Rio-Grande do Sul

Cattle raising in Rio Grande do Sul is subject to great and continuous losses in winter, which are unfortunately inevitable, the enormous stretches of land and the large number of cattle making it impossible to build shelters for the animals or sheds for stacking hay, the expenditure for which would be greater than the farmers could afford.

Until recently, the centre of the butcher's meat monopoly was in the port of Pelotas; but with the laying down of railways in the interior of the state the number of slaughter houses is continually increasing in those parts, especially towards the frontier of Uruguay; and only a third of the animals needed to supply the butchers all over the country are slaughtered at Pelotas. In the whole of Rio Grande do Sul during last season, 700 000 beasts were slaughtered, the number being divided between about 30 slaughter houses.

It has not been possible so far to collect complete statistics of the cattle in the whole of the State, but for the district of Bagé it has been ascertained that out of 230 997 horned cattle, 196 282 are of the native Crioulo breed, the remainder comprising 14 866 Durhams (Shorthorns), 14 981 Herefords, 8393 Dutch and 1849 Zebus.

The European breeds of horned cattle degenerate rapidly in consequence of insufficient lime in the pasturage soils, whereas the Zebus flourish and easily reach a weight of 600 kg.

Out of 181 100 sheep, belonging to this district, more than half are of the native Crioulo breed and the rest of the Rambouillet breed, with the exception of a few Lincolns and Leicesters. There are 25 640 horses, nearly all natives, the remainder being Arabs, Percherons, English and Norman.

Forty-eight horned cattle have just been imported by the Government of Rio Grande do Sul from Antwerp, to be used for crossing, some of them going to the Government stud farms and the remainder being distributed among private breeders.

Rice and bean growing is increasing in the State, and in certain districts is giving very good results. There is considerable difficulty, on the contrary, in the cultivation of barley and rye. In spite of the fact that all attempts made to introduce wheat have failed, the Government is still making every effort to succeed, and for this purpose so-called cultivation bounties are granted to the large proprietors. Mr. L. Orione, an Italian, supported by the Government, has founded a large Company for the cultivation of wheat, which bases its hopes of success on the fact that the State of Rio Grande used to export wheat in former times. The soil of the country, which is rich in phosphoric acid, is certainly favourable to this cultivation.

LORY. **Agriculture in Chile.** — *Questions Diplomatiques et Coloniales*, N. 336, p. 223. Paris, Févr. 14, 1911. **374**

Chile

Some of the *hacendados* are setting an example of careful cultivation, with the good rotations of crops, improvement of land and the use of machinery; while others are putting the sale of agricultural products on a commercial basis. The desire for the latest innovations is noticeable all over the country.

In 1910, the Chamber of Deputies passed an irrigation-bill, providing for the institution of an *Oficina Nacional de Riego*, of which the staff were to draw up plans for the agricultural hydraulic works asked for by farmers or prescribed by the State and see to their execution.

Land is still divided into estates too large for good culture, which are cultivated, as a rule, without regard to a profitable return. Chile, although the country of nitrate, uses comparatively small quantities of this fertiliser; and yet some exhausted soils are sown twice a year, first with maize, and then with wheat or barley. In order to improve this state of things, a law has recently been promulgated to favour the use of fertilisers.

The vine is an old cultivation in Chile, and there is a production of 3 million hectolitres of wine to-day, most of it containing a high percentage of alcohol, and some being of the very highest quality. During the phylloxera crisis, Chile was able to sell some of her wine in Europe, but this market was afterwards closed. The Government bounties are not sufficient to compensate the growers for this loss, and many of them have recourse to making alcohol and drying grapes, often in a very primitive manner.

The same applies practically to fruit cultivation (although Central Chile is as well adapted to this industry as California), and to cattle-raising, for which the Southern provinces offer unlimited possibilities. The dense southern forests have also been neglected; they are nearly 20 million hectares in area, but to a large extent unpenetrable.

Every where in Chile the methods employed in the utilisation of the natural wealth of the country are insufficient or obsolete. Manual labour and capital might be very profitably employed by Chile.

375 European Agricultural Colonisation in Dahomey. — *Bulletin de l'Office Colonial*, No 34, p. 314. Melun, October 1910.

French West Africa: Dahomey

European agricultural colonisation in Dahomey is still experimental; there are few plantations of any extent, and those are all in the upper zone of the coast region. All the efforts of the Europeans, so far, have been brought to bear on the cultivation of cacao, rubber, vanilla, kola, etc. Some attempts have been made to cultivate American cotton and coffee, but too much labour is required in their production. Vanilla is not very successful, but it seems that the kola tree, imported from Guinea, is likely to give good results.

In Northern Dahomey no attempts at agricultural colonisation have been made, on account of the difficulty of transport; cattle-raising is the chief source of wealth in this region. The karité, nétté and cotton grow here and might be the source of considerable trade. Nearly all the fertile lands are in the hands of native farmers, so that European colonisation is restricted within very narrow limits. The colonists encounter insurmountable difficulties, which necessitate great tenacity and considerable outlay. Manual labour is also very scarce, very dear, and not of the best.

The oil palm, raphia, cacao and maize are cultivated successfully by the natives but they are not sufficiently remunerative to the Colonists.

O. F. BLACK and C. L. ALSBERG. **Maize and Pellagra in the United States.** — *U. S. Department of Agriculture. Bureau of Plant Industry. Bulletin* No. 199, p. 36. Washington 1910. **376**

United States

The U. S. Department of Agriculture has issued a bulletin on "The Determination of the Deterioration of Corn with Incidental Reference to Pellagra." As a necessary preliminary step in the investigation of the alleged relation between spoiled maize and pellagra the writers have made a critical study of the methods of detecting products of deterioration in maize and maize-meal. The recent recognition of pellagra in the United States has emphasized the fact that there is a lack of such information in a form available for English readers and has brought about a considerable demand for it. The bulletin deals critically with the value of methods employed in foreign countries and contains experimental data bearing upon their application to conditions in the United States. The work constitutes a first step in the study of the constituents of maize and the possible production of toxic substances by its deterioration.

Mc. GARVEY CLINE. **The Forest Products Laboratory in the United States.** — *The Journal of Industrial and Engineering Chemistry*, vol. 3, No. 1, pp. 15-25. Easton, Pa. Jan. 1911. **377**

United States: Wisconsin

In cooperation with the University of Wisconsin, the Forest Service of the United States has founded a Laboratory for the practical investigation of Forest Technology, which is intended:

I. To ensure authoritative information on the characteristic mechanical and physical properties of different woods;

II. To study and develop the treatments for the preservation of wood, its use for the production of fibrous materials (pulp, paper, fibre, board, etc.), and in the production of alcohol, turpentine, tar and other chemical materials;

III. To introduce practical methods for the utilisation of wood which under present conditions is being wasted;

IV. To serve as a public bureau of information in regard to the properties and utilisation of forest products;

V. To cooperate with the consumers of forest products for the improvement of the present means of utilising these products, also in formulating specification and grading rules for wood products, commercial woods, and the materials used in the treatment of the latter.

The Laboratory is at Madison, in Wisconsin. The University supplies the premises, light and heat, and energy, while the Forest Service pays the staff and supplies the equipment.

Summary of the field of work of the Laboratory:

1) Physical properties of wood: specific gravity, stability, microscopical structure, specific heat and conductivity;

2) Mechanical properties of wood: resistance and allied properties;

3) Chemical properties of wood: quantity and quality of the oils, tannins, gums and other products that may be secured especially from forest waste;

4) Drying of wood: natural and artificial;

5) Agents destructive to wood: plant and animal parasites;

6) Preservation of wood: impregnation with preservatives and fireproof substances and other materials;

7) Dry distillation of wood: perfecting of methods in use and estimation of products;

8) Pulp and paper industries: kinds and forms of wood that are best suited for the production of pulp and of paper; utilisation of wood residues;

9) Production of resin and its derivates: methods of preventing damage to trees causing unnecessary loss of the products.

The Laboratory is divided into nine sections:

I. *Maintenance.*

II. *Engineering.*

III. *Wood testing:* the mechanical properties of the commercial woods of the United States are at present being studied, as well as the mechanical effects of methods of wood-preservation under pressure and the determination of the efficiency of joints used in wooden structures.

IV. *Preservation of wood:* the efficacy of the various preservatives is now being studied, and the best methods for their application. Service tests on the preservation of red oak and maple sleepers, are being made in conjunction with a railway company. Investigations are being made also into the anti-cryptogamic properties of the various components of creosote and the preservation of wood used in the construction of silos.

V. *Technology of wood:* the correlation between the microscopical structure of commercial woods and their properties and uses, the changes in temperature of wood and the rapidity with which it can be heated, as well as artificial methods for drying it, are now being studied.

IV. *Distillation: a)* experiments for determining the quality and quantity of the products that may be obtained from different woods; *b)* the study of different methods and apparatus for distilling wood and refining and grading the products obtained.

VII. *Pulp and paper:* utilisation of the different woods.

VIII. *Chemistry: a)* utilisation of forest products which are still neglected; *b)* estimation of wood products and the materials connected with them. The following practical investigations are in progress: classification of commercial creosotes; quantities and qualities of the tannins in different woods and barks; methods for analysing treated woods.

IX. *Pathology:* in collaboration with the Bureau of Plant Industry of the Department of Agriculture, for the study of timber parasites.

378 **Rural Education in Great Britain.** — *Board of Education. Memorandum on the Principles and Methods of Rural Education*, in-8, pp. V, 48. London, 1911.

Great Britain: England

The above Memorandum regards Rural Education in Great Britain, as distinguished from the higher forms of Agricultural Education, given in independent Colleges or in connection with Universities (1).

County Staffs and Agricultural Institutes. — Agricultural instruction is conducted, wholly or mainly, by an expert county staff, in Bedfordshire, Bucks, Cornwall, Devon, Hereford, Lancashire, Oxfordshire, Somerset, Glamorganshire, Monmouthshire and Montgomeryshire. Institutes devoted entirely to agricultural education are much needed.

Elementary Schools. — The teaching in the rural schools now includes, in many cases, practical subjects, such as bee-keeping, poultry-raising, destruction of insects harmful to crops etc., the observation of soils, winds, and other local conditions, the calculation of the cost of labour, of simple building operations etc.

In the year 1908-9, the latest for which statistics are as yet available, there were in Great Britain 1505 elementary day schools in which gardening was taught, and the scholars for whose instruction in that subject grants were paid (by the Board of Education) numbered 24 316.

Secondary Schools. — The teaching in these often includes, not only instruction in Agriculture or Horticulture, but a science course, which is really fundamental to rural industry.

The schools may be classified as follows;

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(1) Compare with: *Board of Agriculture and Fisheries.* « Annual Report on the Distribution of Grants for Agricultural Education and Research »; and *Inter-departmental Committee for Agricultural Education in England and Wales.* « The Journal of the Board of Agriculture », Oct. 1909, vol. XVI, No. 7, pp. 529-533.

Secondary Schools. — 1) Schools at which an ordinary Science Course is supplemented by instruction in Agriculture or Horticulture: England: Cirencester, Cleobury, Mortimer, Odiham, Cramworth, Wem; Wales: Newtown, Welshpool.

2) Schools at which a Biological Science course has been established: Calne, Chippenham, Malmesbury, Morpeth, Pickering, Spalding.

3) Schools at which a definite rural bias has been given to a Biological Science Course: Alford, Ashburton, Beaminster, Blackford, Brampton, Caistor, Donington, Hanley Castle, Kirkham, Kirtonn, Karesborough, Nantwich, North Walsham, Shepton Mallet, Wellington (Somerset), Wotton-under-Edge.

4) Schools at which a Biological Science Course is supplemented by instruction in Agriculture: Barnard Castle, Brewood.

5) Schools in which the curriculum is particularly designed for boys who intend to follow agricultural occupations: West Lavington.

Rural Evening Schools. — In these, some time is given to rural science, both practical and theoretical instruction being imparted. The subjects studied include gardening, bee-keeping, plant-life, soils and local geology.

Farm Schools and Short Courses of Instruction in lieu of Farm Schools.

Agriculture (Armstrong College) Basing, Chelmsford (Harper Adams College) (Midland Agricultural College) Newton Rigg (Reading), Ridgmont, (Uckfield Agricultural College), Swanley Agricultural College.

Horticulture. Basing, Chelmsford (Swanley Horticultural College.)

Dairying. Basing, Chelmsford, Bromyard, Garforth Farm, Hutton, Huntsham Court, Grifthouse, Gloucester (Midland Agricultural College), Ipswich, Newton Rigg, Radbrook (Reading), Ridgmont, Worleston.

Poultry Keeping, Bromyard, Basing, Hutton (Midland Agricultural College), Ipswich, Ridgmont.

Domestic Econor y. (Midland Agricultural College), Radbrook.

Itinerant Instruction in Manual Processes, Farriery and Dairying.

The principal operations considered under this heading, are ploughing, stacking, thatching, sheep-shearing, and the management of machinery.

379 **Fresh Fruit Packing Schools in British Columbia.** — *The Canner and Dried Fruit Packer*, vol. XXXII, No. 2, p. 44. Chicago, 19 Jan. 1911.

Canada: British Columbia

Mr. W. E. Scott, Deputy Minister of Agriculture for British Columbia, has issued the following circular:

"In accordance with the policy of the Department of Agriculture, which is to educate fruitgrowers in the production of the highest class of fruit, the fruit branch of the Department last winter conducted a series of five packing schools for the teaching of the proper and most up-to-date methods of packing and wrapping fruit. This work proved very popular, and undoubtedly met the needs of the districts in which the packing schools were placed. Fruit-growers of the province will therefore be pleased to learn that this work will be continued and further extended, so as to establish these schools in fruit districts of the province where desired and where a sufficient number of pupils can be secured."

Agriculture. — Agricultural Physics, Chemistry and Botany.

G. Masson. **Researches on Saponine Plants**, p. 114. Lons-le-Saunier, Imprimerie Declume, 1910. 380

France

This account shows that the methods hitherto employed for the preparation of saponines only result in the extraction of mixtures containing saponines, reducing sugars, carbo-hydrates, and organic salts of acids which possess the properties of saponines, for which the name of "saponoids" is suggested.

Investigations were made on the following plants: *Saponaria officinalis, Gypsophila Struthium, Lychnis Githago, Quillaja Smegmadermos, Polygala Senega, Aesculus Hippocastanum, Sapindus Mukurossi, Smilax.*

Mr. Masson separated the saponines, saponoids, carbo-hydrates, and the reducing sugars which they contained, and examined these different compounds.

The result of his investigations showed that saponines do not occur so frequently in plants as appeared from previous reports on the subject, but that saponoids, on the contrary, are very often met with.

J. E. Duschsky, I. R. Minz and W. P. Pawlenko. **Nitrogenous Constituents of Beetroot.** (Stickstoffhaltige Bestandteile der Rube und ihre Bewegung im Gange der Rohzuckerfabrikation). — *Zeitschrift des Vereines der Deutschen Zuckerindustrie*, 660 Lief., pp. 1-25. Berlin, Jan, 1911. 381

Russia

This series of investigations, on Russian beet of the season 1909-10, led to the following conclusions:

1) The total nitrogen content of the beet varies between 0.17 % and 0.25 %, or between 1.0 and 1.2 to 100 parts of sugar.

2) Nearly half the total nitrogen is albuminoid nitrogen.

3) As the quantity of total nitrogen increases, the quantity of albuminoid nitrogen diminishes.

4) About a third or a half of the total nitrogen is injurious, but the proportion is not definite.

5) It is not possible to find any relation between the sugar content and the various groups of nitrogenous substances.

6) About 4/5 of the albuminoid nitrogen do not pass during diffusion.

7) The albuminoids which pass into the diffusion juice are almost entirely eliminated in the saturation juice.

8) Nearly the whole of the injurious nitrogen passes into the diffusion juice and afterwards into the saturation juice, sometimes increasing in its proportions.

382 P. A. DANGEARD. **On the Determination of the Active Rays in Chlorophyllian Synthesis.** — *C. R. Ac. Sc.*, t. 152, No. 5, p. 277. Paris, Janvier 30, 1911.

France

Mr. Dangeard has availed himself of the special sensibility of an alga, a *Chlorella*, to the intensity of light, and also of the facility with which this organism is cultivated in a medium containing absolutely no organic carbon, for the purpose of determining the active rays in chlorophyllian synthesis.

The algae were made to form a delicate, homogenous lining on the walls of a culture vessel with parallel surfaces, graduated in millimetres so as to facilitate research.

A very pure spectrum was projected on to the green lining formed by the algae. In the portion struck by the active rays the growth continued and the thickness of the green layer increased, whereas the growth was arrested in the shade and at the place illuminated by the inert rays. It appears from this that the most active rays correspond to the absorption band in the red of chlorophyll, for which the wave-lengths of 670 to 635 (Jost) are given.

A Nernst lamp was used as a source of light. This method of investigating chlorophyllian action requires further testing.

383 W. LUBIMENKO. **Chlorophyll Assimilation and the Production of Dry Substance in White and Coloured Light.** — *Revue générale de botanique*, tome XXIII, No. 265, pp. 1-14, pl. 1. Paris, Jan. 15, 1911.

France

Mr. Lubimenko has made some investigation on chlorophyllian assimilation and the production of dry substance in white and coloured light, in *Raphanus sativus*, *Pisum sativum*, *Tropaeolum majus*, *Phaseolus vulgaris* and *Daucus Carota*.

He concludes as follows:

1) There is an *optimum* of light for the production of dry substance by the green plant. But the absolute value of this *optimum* of light is less than that at which the chlorophyllian apparatus gives the maximum of photochemical work, as expressed by the decomposition of carbon dioxide.

2) The energy of the decomposition of carbon dioxide by a green leaf in a coloured light depends on the chlorophyllian absorption of various coloured rays as well as on the calorific energy of the rays.

3) The actual fixation of carbon, measured by the increase of dry weight in the course of its development, is unequally influenced by differently coloured rays. The maximum production of dry substance corresponds to the blue-violet rays and not to the red rays of the spectrum. The increase of dry weight under the orange-red rays is inferior to that under the red rays, the minimum increase being produced by the green rays.

4) This suggests that chlorophyllian assimilation includes two successive stages.

The first stage is characterised by the decomposition of carbon dioxide and the synthesis of the first organic production. In this phase the plant utilises chiefly the energy of the red rays of the solar spectrum.

The second stage is characterised by the definitive fixation of the first organic product, elaborated in the green cell. For this work the plant uses mainly the blue-violet rays.

J. STOKLASA and W. ZDOBNICKY. **Photochemical Synthesis of Carbo-hydrates in the Absence of Chlorophyll.** (Photochemische Synthese der Kohlenhydrate aus Kohlensäureanhydrid und Wasserstoff in Abwesenheit von Chlorophyll). — *Biochemische Zeitschrift*, XXX B., VI H., pp. 433-456 + fig. 1 + tab. 1. Berlin, Jan. 31, 1911. **384**

Austria: Bohemia

The following are the results of six experiments:

1. No formaldehyde or carbo-hydrates are formed by the action of the ultra-violet rays on carbon dioxide in the absence of potassium hydroxide (KOH).

2. Formaldehyde is formed, but not carbo-hydrates, by the action of the ultra-violet rays on water vapour and carbon dioxide in the presence of potassium hydroxide.

3. Neither formaldehyde nor carbo-hydrates are formed by the action of the ultra-violet rays on carbon dioxide and on hydrogen, *not in the nascent state*, in the presence of potassium hydroxide.

4. With carbon dioxide and hydrogen in the nascent state, in the presence of potassium hydroxide, formic acid is formed without the action of the ultra-violet rays.

5. Sugar is formed by the action of the ultra-violet rays on carbon dioxide and hydrogen in the nascent state, in the presence of potassium hydroxide. The synthesis of sugar under such circumstances, has not been previously observed.

6. By referring these results to the processes in living chlorophyll-cells, it may be assumed that the pure carbon dioxide in these cells is not reduced by nascent hydrogen. The reduction is due to the bi-carbonate of potassium which is formed, and, in the presence of potassium, formaldehyde is condensed to carbo-hydrates.

385 P. Barakov. **Action of Carbon Dioxide in the Soil on Vegetation.** (Soderjenié uglekisloti v potchvakh u raslitchnié périodi rosta rastenii). *Journal Opetnoi Agronomii* (Journal of Experimental Agriculture). God. XI, Kniga 3, pp. 321-343. St. Peterburg, 1910.

Russia

Various plants were cultivated on the same quality of soil (loam and loess), and some crops of *Lupinus luteus* on different kinds of soil.

The results may be summed up as follows:

1. Root respiration constitutes the most important source of carbon dioxide.

2. The quantity of carbon dioxide in the soil, which is small at the beginning of vegetation, increases gradually, attaining its maximum during the flowering period. Afterwards it decreases rapidly, and is at the minimum during the ripening of the fruit.

3. The comparative study of the respiration curve for the various plants is very interesting.

The curve of the Lupin, the roots of which assimilate with great energy, reached its maximum at the flowering period, even in a poor soil. The same applied to oats, except that the maximum was reached two weeks before blooming.

Barley and wheat gave a much less accentuated curve. Root and tuber plants (beets, potatoes, etc.) are characterised by the duration of an extremely active respiration period; which, in the case of the beet, coincides with the period of maximum growth, and in the case of the potato occurs after flowering.

4. Thus, assimilation and respiratory intensity advance together.

5. Decomposing organic matter has a limited part in the production of the carbon dioxide of the soil.

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L. MONTEMARTINI. **On Nutrition and Reproduction in Plants.** (Sulla nutrizione e riproduzione nelle piante. Parte I-VI). — *Atti dell'Istituto botanico dell'Università di Pavia*, Serie II, vol. XIV, pp. 65-128, tav. I-VIII, and vol. XV, pp. 1-42, tab. X-XII. Milano, 1910.

Italy

After a critical examination of the works dealing with nutrition, growth and reproduction in plants, Mr. Montemartini studies the relation of plant food to the formation of the vegetative and reproductive organs.

The experiments were made on plants with small and easily germinating seeds: *Solanum nigrum*, L., *Torenia Fourneri*, Linden, *Tropaeolum majus*, L., and also on wheat, oats, maize, etc., special nutritive solutions being used. The deductions drawn from these investigations are, that it is not the simple quantitative variations of the water given to the plants, or of the dissolved mineral substances, which cause the differentiation of the meristems that are instrumental in the formation of terminal buds. The question is one of special chemical processes which need determining, and for which it is important to know the quality of the mineral substances supplied, as well as the chemical and physico-chemical state of the protoplasm.

In the formation and development of reproductive and vegetative organs, a large part is played by the nature of the mineral substances supplied to the plant, particularly by the predominance of phosphorus chiefly and of nitrogen in the second place.

Demineralisation of the organism (nutrition with distilled water only), if not too prolonged, renders the protoplasm more sensitive to the food afterwards provided. An incomplete initial nutrition leaves the plant in special conditions, which vary according to the food given, while the organism reacts to this in a manner different from that in which it reacts to the nourishment afterwards supplied.

In the third part of his work, the writer studies the influence of external conditions on the absorption and assimilation of the various nutritive substances, and their relation to reproduction. Experiments have shown that the absorption of nitrogen and phosphorus by the plants does not always occur in the same ratio, the proportions varying according to external conditions. Generally speaking, it may be said in the case of the plants studied, that the conditions of temperature and light more favourable to the absorption of phosphorus are those in which the organs of reproduction are best developed.

The fourth part of this work tends to prove that the organs of reproduction are produced by definite internal and external conditions, which cause the meristems to differentiate in one way rather than in another.

These experiments may be useful in throwing light on the conditions favourable to the growth of crops.

387 J. Pouget and D. Schuchak. **The Absorption of Phosphoric Acid by Plants.** (O pogmosttchienii rasteniani fosfornoi kisloti iz pastvov). — *Journal Opetnoi Agronomii; (Journal of experimental Agriculture)* God. XI, Kniga 6, pp. 825-831. St. Peterburg, 1910.

Russia

These experiments were made with the object of determining the action on plants of phosphoric acid in the form of bi-potassic phosphate, at different concentrations: 4 mgr., 3.8 mgr., 2 mgr., 1.1 mgr., 1.0 mgr., 0.55 mgr., 0.275 mgr., 0.137 mgr., 0.1 mgr., 0.068 mgr., 0.05 mgr., of phosphoric pentoxide in 50 cc. of water. Young wheat plants of 1 to 1 $^1/_2$ months were used, and the experiments lasted from 17 to 70 hours.

The results obtained were as follows:

1) In a concentration of 1 to 4 mgr. of phosphorus pentoxide in 50 cc. of water the absorption of phosphoric acid by the roots is in proportion to the concentration.

2) There is no relation between transpiration and the absorption of phosphoric acid.

3) The phosphoric acid is absorbed more rapidly than the water, and the concentration of the nutritive solution consequently decreases gradually.

4) There is no direct proportion between the absorption and the concentrations in the case of the solutions containing 1.0, 0.5, 0.275, 0.137 mgr. of P_2O_5, and while the concentration decreases according to $^1/_2$, $^1/_4$ $^1/_8$, the quantity of P_2O_5 absorbed by the roots varies according to the ratio:

$$\frac{1}{2.4} \quad \frac{1}{5.7} \quad \frac{1}{4.1}$$

5) With lower concentrations (0.1, 0.068, 0.05) the roots secrete P_2O_5 instead of absorbing it, a larger quantity of phosphoric pentoxide being found in the nutritive solution at the end of the experiment.

388 Th. Pfeiffer and E. Blanck. **Incompatibility of Lupins with Lime.** (Die Kalkfeindlichkeit der Lupine, sowie Bemerkungen über das Verhalten auch einiger anderen Pflanzen alkalisch bezw. sauer-reagierenden Nähr flussigkeiten gegenüber). — *Mitteilungen der Landwirtschaftlichen Institute der K. Universitat, Breslau,* Bd. VI, Hf. II, pp. 273-313. Berlin, 1911.

Germany

A critical examination of preceding investigations, and a description of five series of original experiments, show that lupins are very sensitive to alkaline nutritive media. The addition of ammonium sulphate to a fertiliser containing calcium carbonate causes the formation of carbonate of ammonia and of ammonia, both extremely injurious to lupins. Sodium nitrate, a physiologically alkaline substance, showed a directly unfavourable action on lupins, which increased if calcium carbonate was added. The action of silicate of calcium was likewise toxic, even more than that of calcium carbonate, probably because it imparted a slightly alkaline reaction to the soil's water content. Manuring with acid sulphate of potassium, on the contrary, gave a relatively large crop, which decreased 50 per cent on the addition of carbonate of potassium. While the lupins grew perfectly well in a sand containing citric acid, the contrary was the case with mustard, though the latter plant grew much better than the lupins in sand to which carbonate of potassium had been added.

The susceptibility of lupins to alkalis is due to the neutralization of the acidity of the roots, which, in the case of lupins, proves harmful. Hence the effect of calcium carbonate although its action is relatively weak, as is shown by experiments made with sodium nitrate, 183.6 gr. calcium carbonate having only a slightly more toxic effect than 3.8 gr. sodium carbonate.

It must also be noted that doses of calcium carbonate up to 30.6 produced practically no injurious effect on the lupins.

The plants in the vessels containing 17 kg. of river sand and 1.7 kg. of water, with 30.6 gr. of carbonate of lime were not harmed, a dose at least six times as much being necessary to produce the toxic effect.

Experiments made to test the effect of alkaline nutritive solutions on potatoes and beets rendered more striking the peculiar susceptibility of lupins to alkalis. Their characteristic antipathy to these substances arises from great root-activity, which enables lupins to hold their own, where other plants would perish. Any neutralization of acidity retards their growth. Hence the presence of any considerable amounts of limestone in the soil is necessarily harmful to lupins.

J. Broili **Contribution to the Morphology of Oats.** (Beiträge zur Hafer-Morphologie). — *Journal für Landwirtschaft*, LVIII, B., H. III, pp. 205-220. Berlin, 1910. **389**

This contribution deals with some preliminary investigations on the exterior appearance of the caryopses of 58 varieties of Oats, furnished by the Royal Agricultural Academy of Weihenstephan in Bavaria, the Selection Institute of Hochburg in the Grand Duchy of Baden, and other Institutions.

Germany: Bavaria Baden

The investigations were concerned with the insertion of the caryopsis, the innervation of the lower glumes, the hairs at the base, the peduncles, the beard, the glumes, the lodicules and the down of the caryopsis.

The results showed such differences in the greater number of these characters that the elements for a classification could not be taken from them. According to the study made of the hairs of the base (number, erect or curled form, length) and the peduncles (length, oval or round form, fluted or hairy) the writer confirms the preceding estimates of Böhmer and Fruhwirth; and although he considers the establishment of typical relations premature, he deems that characters of this kind may be very useful in their variations for determining the unity of type in a variety.

390 C. Tropea. **The Pod of *Vicia Faba*, L.** (Note anatomo-biologiche. I. Il baccello di *Vicia Faba*, L.). — *Bollettino del R. Orto Botanico e Giardino Coloniale di Palermo*, vol. IX, appendice, 1910, pp. 6-16, tav. I, fig. 7-12. Palermo, 1910.

Italy

Mr. Tropea has examined the structure, origin and rôle of the thick layer of hair which lines the interior of the pod of *Vicia Faba*, L., enveloping the beans. He believes that these hairs maintain around the beans the moisture necessary for their growth, without allowing it to be so excessive as to cause them to germinate. If the pod should happen to be detached from the plant, it will be protected against drought by this lining of hairs which, whilst maintaining the necessary moisture, does not prevent the growth of the beans.

391 O. F. Cook. **Dimorphic Branches in Tropical Crop Plants: Cotton, Coffee, Cacao, the Central American Rubber Tree and the Banana.** — *U. S. Dept. of Agr., Bur. of Plant Industry, Bull. N. 198.*, pp. 7-57. Washington, Jan. 14, 1911.

United States

Some of the principal plants cultivated in the tropics, such as cotton, coffee and cacao, the Castilloa rubber and the banana, have a very pronounced dimorphism of the branches. Each normal plant produces two kinds, which are different in form and function.

This factor should be taken into consideration, both in scientific studies and in cultivation experiments on the different varieties. There is a definite relation in each species between the functions of the branches and their positions or points of origin on the internodes, but there is no general relation of position to function which is applicable to all the species or even to any two; thus if the agricultural importance of the dimorphism of branches is to be fully understood, each plant must be studied separately.

Cotton plants. — In these dimorphism is a normal condition in all the cultivated varieties. The axillary ramifications are sterile as well as the principal cauline axis; the fertile shoots grow by the side of the axillary bud and may sometimes assume vegetative functions. This fact is particularly noticeable among plants of recent importation; and the re-establishment of the primary fertility represents a phase of the process of acclimatisation. Dimorphism is also an important factor in the problem of resistance to the cotton-weevil. The plants in which the sterile part of the ramification is strong and abundant give a cotton which ripens later than that produced by other plants, and is thus less exposed to the attacks of this insect.

Castilloa (rubber plant of Central America). — The axillary branches of this plant have not the same physiological value as the main stalk or trunk; they bear flowers and fruit but are shed after a few seasons. The permanent branches always arise from extra-axillary positions, and do not develop, as a rule, until the plant has reached the age of three years. There is no need of pruning.

Coffee plants. — Only the vegetative branches, or uprights, like the primary trunk, are produced from true axillary buds. All the fertile branches, or laterals, have extra-axillary positions. The crop is borne only on young wood of lateral branches, a vigorous growth of these must therefore be maintained, if good crops are to be secured. New uprights must be formed to produce new laterals, or the latter may continue to grow and subdivide, if the growth of the uprights is prevented by pruning.

Cacao tree. — There are two different types of ramification in the cacao tree also, each of which may sometimes produce flowers. The trunk elongates by a series of annual twigs which curve upward, and later on, pushing to one side the extremity of the cluster of whorled branches from which they have sprung, settle themselves in an axial direction. They bear leaves with long petioles (about 3 inches) and terminate in a whorl of from 3 to 6 branches, the leaves of which have a short petiole (about 1 inch).

Whilst this habit of growth has advantages for the plant growing in a wild state, such as that of permitting it to shoot up rapidly above the brushwood towards the air and light, it has on the contrary numerous disadvantages from the point of view of practical cultivation. These, however, are remedied by pruning, thus forcing the plants while still young, to form their crowns with the two or three branches of the first whorl.

L. ALTHAUSEN. **Cultivation Experiments in Russia with Buck-Wheat.** **392**
(Niekotoriia Danniia is rabot s grecikoi). — *Journal Opetnoi Agronomii* (*Journal of Experimental Agriculture*), God. XI, Kniga, 6, pp. 801-818. St. Peterburg, 1910.

The results are given of numerous cultivation experiments made by Mr. Althausen on some varieties of white and red flowered buck-wheat from 1908 to 1910. **Russia**

I. *The productivity in caryopses and the value of the "leap" are in inverse ratio.* — By the "leap" is meant the distance which separates the extremity of the highest ramifications from the extremity of the ramifications inserted immediately below.

As the value of this element varies according to the height of the plant, in the opinion of Mr. Althausen, the plants were divided into groups according to their height in centimetres. In each group the "leap" was never more than 10 cm.

These groups were in turn divided into sub-groups with yields above or below the average, and in each sub-group there were two divisions based on the same characteristics.

The experiments were made with the two varieties of Buck-wheat: that with white and that with red flowers. The results are set forth in special tables, an examination of which clearly shows that there is an inverse ratio between "leap" and productivity.

Thus in the first group, of the red variety, with a plant from 30 to 39 cm. high the four sub-divisions: having respectively a "leap" of 1.8, 2.5, 4.9, 5.2 centimetres yielded 2.044, 1.44, 0.616, 0.419 grams.

II. *There is a direct ratio between the productivity, the height of the plant and the weight of the straw.*

N° of group (10 plants)		1	2		4	5	6
Yield in caryopses	gr.	1.45	3.59	6.57	8.45	10.5[illegible]	13.[illegible]
Height of plant	cm.	66.6	76.6	81.4	87.1	90.0	95.4
Weight of straw	gr.	2.56	4.5[illegible]	7.22	7.2[illegible]	7.97	10.[illegible]

The increase of the crop is due to the greater number of caryopses and not to the increase in the weight of the grains, which vary within very narrow limits: 0.023 to 0.025 grams.

III. *There is a direct ratio between the yield and the number of ramifications.* — This is proved by the following average valuation for each plant, classed according to the yield in grains:

N° of group (of 10 plants)	1	2	3	4	5	6	7	8	
With red flowers	1.8	1.9	4.1	4.0	5.9	5.1	7.0	7.[illegible]	number of branches
» white flowers	6.1	8.8	10.7	11.5	11.6	14.6			

In the experiments made in 1909 with the same object, the principal ramifications are distinguished from the secondary ramifications.

The examination of 470 samples has shown that the caryopses produced by the principal ramifications represent alone 81 % of the total crop and have a weight respectively superior to that of the grains produced by the secondary ramifications; 0.0217 and 0.0202 grams.

The plants with white flowers are more abundantly ramified than the plants with red flowers.

393 A. Howard, L. Gabrielle, C. Howard, Abdur Rahman Khan. **The Economic Significance of Natural Cross Fertilisation in India.** — *Memoirs of the Dept. of Agr. in India*, vol. III, N. 6, pp. 281-330. Agricultural Research Institute. Pusa, Oct. 1910.

British India

The entire October number of the *Memoirs of the Department of Agriculture in India* is devoted to a study of the economic significance of the cross-fertilisation which occurs naturally in the fields.

Attention must be called especially to the data relating to some species and varieties of *Triticum* a preeminently self-fertilising plant, pollination taking place before the extrusion of the anthers.

Thus in a field of white chaff emmer *Triticum dicoccum*, var. *Farrum*. Bayle, three stray ears were found with red chaff in 1909. The hybrid characters of these plants, were clearly shown afterwards by the numerous secessions in the individuals of the F_2 generation,

N°.	F_1 1908 (parent ear)	F_2 1909 (progeny)
1	Bearded, chaff smooth red, grain red.	All (5) bearded, chaff smooth, grain red. 1. Chaff white, rachis brittle. 2. « » rachis tough, grain easily shed. 2 chaff red, rachis brittle.
2	Idem.	All (6) bearded, chaff smooth, grain red. 2. Chaff white, rachis brittle. 4. » red « »
3	Idem.	All (2) bearded, chaff smooth, grain red. 2. Chaff red, rachis brittle.

In all probability the *Triticum dicoccum* Schrk. var. *farrum* Bayle has, in this case been cross fertilised naturally with a red chaff emmer variety with grain of the same colour.

Similar observations were made, in different localities of India, on the following varieties:

Triticum	*compactum*	Host	var.	*erinaceum*	Kcke
»	»	»	»	*Linoza*	»
»	»	»	»	*Humboldtii*	»
»	*vulgare*	Vill.	»	*erythrospermum*	»
»	»	»	»	*erythroleucon*	»
	»	»	»	*graecum*	»
»	»	»	»	*alborubrum*	»
»	»	»	»	*fuliginosum*	Al.

Natural crossing occurred much more frequently in the Canal Colonies of the Punjab than at Bihàr. In 1907 there were only five cases at Pusa, whereas there were 226 cases verified at Lyallpur.

In the dry climate of the Chenab Colony wheat is grown entirely by Canal irrigation, being watered as a rule twice after sowing, the last time after the plants are in ear. The supply of water in the soil in sometimes so small before this last irrigation, that the plants wilt under the sun's heat, the glumes open and the stigmata are exposed to the air.

Natural crossing is easy under such circumstances, and it is not surprising that it should occur, but it might perhaps be prevented to a certain extent by more frequent and even watering.

The importance of the phenomena should not be overlooked by those who are interested in the problems of the selection and crossing of cereals.

If the appearance of hetero-zygotes amongst individuals which are usually homozygosporangial detracts from the uniformity of the products, it at least makes possible the creation of new forms, and thus enlarges the field of selection, which is limited to the separation of the best types in the autogamous species.

The cultivators recognize two great groups of cultivated peas — purple flowered peas (*Pisum arvense* L.) known in India as *kerao* and white flowered peas (*P. sativum* L.) known as *mattar*. Self-pollination is the rule with both, in Europe, and natural cross-fertilisation is supposed not to take place. But two undoubted cases of this cross-fertilisation were observed at the Experiment Station at Pusa. The Memoir is illustrated by some fine plates showing a number of cases of natural cross-fertilisation, which have been found to occur in the case of various cultivated plants frequently detracting from the uniformity of the crops. Among the cases verified were the tobacco plant, *Hibiscus caunabinus* L. (Patwa), the Cotton plant, Flax. Linseed, *Papaver somniferum* L., *Carthamus tinctorius* L. (2) and several species of the genus *Brassica*, cultivated for the oil that is extracted from the seed.

It follows therefore that in the cultivation of tobacco, and in all crops where uniformity is the first consideration, that the system of Line Breeding, or growth from single plants, is the method to be adopted.

If, however, there is reason to place strength and luxuriance before the uniformity of the crop, as in the case of Maize, it is better to adopt the system of free fertilisation, or Broad Breeding. In this case, the offspring of different individuals are allowed to interbreed freely with each other, so that the plantation is perpetually renewed by the creation of new forms and different types.

Great care must naturally be observed in the distribution of the seeds from exotics.

For some years the crops must be carefully watched and hybrids must be eliminited as well as such forms which betray racial impurity through want of hereditary uniformity (splitting forms).

The failure of the introduction of Egyptian cotton into Texas appears to have been due to the fact that the cotton grown in Egypt is a mass of hybrids, some of which are very undesirable.

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(1) *Hibiscus cannabinus* L. (Malvaceae). A textile plant which is extensively cultivated in India.

(2) *Carthamus tinctorius* L. (Compositae), in sometimes cultivated in India for its colouring matter and sometimes for the seeds, from which oil is extracted. [*Ed*]

394

E. Legier. **Selection of Beets in H. Mette's Seed Farm at Quedlinburg in the Harz, Germany.** — *La Sucrerie indigène et coloniale*, T. LXXVII, No. 2, pp. 25-35. Paris, Jan. 10, 1911.

Germany: Harz

An account is given of H. Mette's seed farms, which date from 1787 and in which special care is given to the production of beet-seed. In this production the aim has always been to combine weight of root with maximum sugar content. It is not possible to obtain, at one and the same time, the maximum richness in sugar and the maximum weight of roots to the hectare; but the different wishes of customers could be satisfied by raising:

1) An extra rich beet with an average weight of root;
2) A large beet with good average sugar content.

The two following varieties fulfil these requirements:

1) *La plus riche de Heinr. Mette*, produced from the improved *Klein Wanzleben*;

2) The *Elite-spécialité de Heinr. Mette.* In the tests made by the Sugar Merchants Syndicate of France, in 1909, this variety was classed first for yield in weight and sugar to the hectare.

The agricultural firm of H. Mette, in addition to selecting beet seeds, also selects and cultivates the seeds of vegetables and flowers, mangels, cereals, chicories, etc. The farm covers 1250 hectares, and the following rotation is usually observed: wheat, beets, potatoes, seeds. Farm manure is used for the wheat, and chemical fertilisers for the other crops.

395

L. Daniel. **Variations in Grafted Potatoes.** — *Revue Horticole*, No. 2, p. 37. Paris, Janv. 16, 1911.

France

Mr. Daniel has made many graftings of tomatoes on potatoes and on belladonna, and has compared the radical systems with those of control plants that had not been grafted. Many of these grafts dried up and gave a variable number of tubers, but the latter were in no way different from the tubers of the control plants; while those which remained green, bore several successive generations of tubers; also the root hairs were highly developed, showing that the vigorous graft had compelled the stock to increase its absorbant apparatus.

In the graftings of tomatoes on potatoes, the formation of tubers of the second and third generation, at continually longer intervals, was very pronounced.

These experiments are a further confirmation of the part played by the ring of tissue formed at the point where stock and scion unite and of the changes caused by the differences of the functional activities of the grafted plants. The stock and the scion undoubtedly react in a special manner on each other. New facts are continually undermining the hypothesis of the absolute maintenance of characters and autonomy in grafted plants.

396 Douglas Houghton Campbell. **The Nature of Graft Hybrids.** — *The American Naturalist*, Vol. XLV, No. 529, pp. 41-53. New York, Jan. 1911.

A critical examination of Mr. Winkler's experiments with graft-hybrids and of the problems connected with this kind of hybridization.

United States

The plants used were the *Solanum nigrum* and *S. Lycopersicum*, which alternately played the part of stock and scion.

After the union was complete the two parts were separated, and numerous adventitious buds grew from the callus, which soon developed from the cut surface:

a) the greater number of shoots arising from these buds presented the characteristics of the one species or the other;

b) others were "chimaera," in which there were two kinds of tissues joined together in a longitudinal direction;

c) a small number of shoots had the true characteristics of hybrids, and these were the result, according to Mr. Winkler, of a complete fusion of the cells, extending even to the fusion of the nuclei.

The botanical character of these hybrids are intermediary but usually one of the species clearly predominates over the other. This predominance is accentuated and becomes absolute at the second generation, when the plant returns either to *Solanum Lycopersicum* or to *S. nigrum.*

Many different types have been obtained by this method, being afterwards propagated by growth and distributed in several botanical gardens, where interesting studies have been made on the new hybrids: *Solanum tubigense, S. Darwinianum, S. Koelreuterianum* and *S. Gaertneriarum.*

According to the latest examinations made, however, with a calculation of the number of chromosomes, the *S. Darwinianum* only has the characters of a veritable hybrid. The other cases are "periclinal chimaera," i. e. the exterior tissues have the characters of one species, and the inner tissues the characters of the other.

397 H. Colin. **Hydrolysis of Some Polysaccharides by Botrytis Cinerea.** — *Annales des Sciences Naturelles*, 87^e année, IX^e série. Botanique, t. XIII, Nos. 1 et 2, pp. 1-112. Paris 1911.

The comparative study of the enzymic decomposition of compounds of the sugar group, caused by a well known mould, the *Botrytis cinerea*, has led Mr. Colin to conclusions among which are the following:

France

1) The *Botritis cinerea* may feed on a large number of polyoses: saccharose, maltose, lactose, trehalose, raffinose, melezitose;

2) The *Botrytis* utilises these sugars by means of special enzyms;

3) The enzyms may be classed under two types, according as they

are diffusible or not; the "invertine" type, is perfectly diffusible, and the "maltase" type remains adherent to the maceration pulp;

4) The diffusible diastases are found in the fermenting liquids; the adherent diastases, on the contrary, such as maltase, never pass into the maceration liquids, so that recourse must be had to the fermenting powders in order to bring them into evidence.

It is obvious from this that a very inexact idea will be formed of the enzymic actions of which a mould is capable if the examination is limited to the activity of the liquids produced by macerating the mycelium.

A LEBEDEFF. **Extraction of Yeast Zymase by Simple Maceration.** — *C. R. Acad. des Sciences*, No. 1, pp. 49-51. Paris, 3 Janv., 1911. **398**

Dry yeast left in water for some time and passed through filter paper gives an extract rich in albuminoids. Mr. Lebedeff has tried whether this extract would make saccharose ferment, and the experiment has been quite successful.

France

In order to obtain the maceration extract, Lebedefthe left 1 part of yeast and 3 parts of water in contact for a night, at the ordinary temperature, and then filtered through filter paper, obtaining a very limpid filtrate the activity and stability of which was much greater than that of the extract obtained by the Buchner and Hahn method. By the Lebedeff method, therefore, it is possible to obtain the zymase, without having recourse to a costly and cumbrous material, by the simple play of osmotic forces.

R. BRUNET. **The Depaty Pasteuriser.** — *Revue de Viticulture*, No. 893, p. 89. Paris, Janv. 26, 1911. **399**

The Depaty Company, of Cognac, is constructing a new pasteuriser.

France

This apparatus consists mainly of two parts, one producing reciprocal action between a hot and a cold current of water and the other being a heating apparatus or pasteuriser, properly so-called. The exchanges of temperature are made by the passage, in opposite directions, of two currents, one hot, the other cold, circulating in two separate systems of tubes which are in contact. The currents are divided in thin alternate layers, separated by a thin metallic partition. The cold current becomes gradually heated as it advances, and is already hot when it arrives at the heating apparatus, which has therefore only to impart to it the extra heat necessary for sterilization. The refrigeration of the pasteurised liquid is effected by means of the liquid which enters the apparatus.

The tubes used are flat and made of unsoldered tinned copper; they are very easy to clean. Generally speaking, this portion of the apparatus is built up by the superposition of its component parts.

The speciality of this apparatus is that it can work at a temperature of from 95 to 100° C. and 105° C. without becoming choked up, and that it can be used for the pasteurising of wines without altering their taste and bouquet.

The recent application of this apparatus to the desulphurization of must makes it extremely interesting.

400 A. Penck. **A New Classification of Climates, Founded on Hydrography.** Versuch einer Klimaklassifikation auf physiogeographischer Grundlage. — *Sitzungsber preuss. Akad. Wiss., Phys.-math. Cl.*, XII-XIII, pp. 236-246, 1910; *Annales de Géographie*, XX^e^ année, No. 109, pp. 87-89. Paris, Jan. 15, 1911.

Germany

In studying climate in one of its principal geographical effects, namely, the part which water plays under all its forms in and on the soil, Mr. Penck has endeavoured to define the great climatic regions of the globe and their subdivisions:

1) He calls the climate of those regions where water exists in the form of snow or ice the *nival climate*. It has two subdivisions: *a*) the *nival climate*, in which all the aqueous precipitations are in the form of snow; *b*) the *semi-nival climate*, in which rain falls sometimes;

2) *Damp climate:* the precipitations consist mainly of rain; evaporation does not cause the rain water to disappear entirely, so that the resulting excess of moisture brings about water-courses. Damp climates are divided into two great subdivisions: *a*) the *polar climate* and *b*) the *phreatic climate*.

In the *polar climate* the melted snow and the rain penetrate into the ground and form *frozen soil*, when the mean temperature falls below—2° C., or 28°.4 Fahr. (Siberia, northern Canada).

The regions where the *phreatic* climate prevails are very varied. In this case the water filters through the soil more or less; subterranean water levels are formed, which feed the springs and by setting up chemical action on the soil give rise to its characteristic varieties. The transition between these two great divisions and the nival climate is represented by the *subnival climate* (European Russia, Central Canada, Central and Northern Europe).

3) The *moist climate* is marked by the shortness of the snow period, and is subdivided into the *temperate climate* (Western Europe) and the *equatorial climate*, where the temperature is constantly high.

4) The *semi-moist climate* is characterised by the year being divided into a dry and a damp season, and here are distinguished: *a*) the *subtropical climate* (rain in winter); *b*) the *monsoon climate* (rain in summer, with cold or cool winters); *c*) the *tropical climate* (rain in summer, winter almost as hot as the summer).

5) *Dry climate.* The rain which falls soon disappears by evaporation; the springs, if there be any, come from the neighbouring damp regions. This climate is subdivided as follows: *a*) the *semi-dry climate*, characterised by the formation of calcareous and gypseous crusts; *b*) the *perfectly dry climate*, where there is practically no rainfall. When this climate appears in the temperate latitudes, it is marked by enormous variations of temperature between the seasons.

TH. REMY and G. RÖSING. **Contribution to the Method of the Bacteriological Analysis of the Soil.** (Beitrag zur Methodik der Bakteriellen Bodenuntersuchung. — *Aus dem Institut für Bodenlehre und Pflanzenbau in Bonn-Poppelsdorf*). *Centralblatt für Bakteriologie, Parasitenkunde und Infektionskrankheiten,* 29 Bd., No. 1-3, pp. 36-77. Jena, 4 Jan., 1911. **401**

Germany

Although the decomposition of nitrogenous matter does not constitute the whole of the biological processes which contribute to the fertility of the soil, there was nevertheless ground to believe that the mode of action of the micro-organisms producing the decomposition of the nitrogenous substances of the soil might offer sufficient data for judging of the biological activity of a soil.

Whilst carrying out their investigations on the biological forces which accumulate nitrogen in the soil, Messrs. Remy and Rösing made a series of experiments with the object of studying the decomposing power of the nitrogenous substances in different soils. The object of the investigations was mainly to obtain a reply to the following questions:

1) Does the intensity with which the soil decomposes peptones correspond to the energy with which it decomposes other organic nitrogenous substances of high molecular weight?

2) In what way does the chemical composition of the inoculation soil act on the decomposition of peptones, and, if this influence exists, can it be eliminated in such a way that the decomposition of peptones may become a factor permitting the biological forces of the soil to be measured?

3) In what measure do the other conditions of the soil act on the decomposition of peptones?

The destruction of peptones is only a phase of a process of decomposition which is manifested in various fashions and in which various organisms take part. It is for this reason that it is necessary to find out whether the intensity of the decomposition of peptones allows the intensity of the total process of decomposition to be measured. It is of equal importance to know whether the intensity with which an inoculation soil decomposes nitrogenous organic substances is constant. This seems very improbable, *a priori*, if account be taken of the difference of the constitution of decomposable organic substances and of the different specific behaviour of the enzyms which cause this decomposition.

The writers used peptones, blood albumen, powdered horn and very fine gelatine. The degree of decomposition of peptones varies according to the inoculation soil. The quantity of nitrogen produced by blood albumen during the same period was less than that produced by peptones; the nitrogen of gelatine was freed with still greater difficulty. Powdered horn, under the conditions of the experiment, had not begun to form the nitrogenous products of decomposition at the end of 12 days. In order to get the biological characterisation of a soil, however, it does not seem to make any essential difference whether peptones or albumen are used, since the specific power of a soil acts on the two substances in the same proportion.

When investigating the reason why the decomposition of albumen only gave 40 °/₀ of the total nitrogen, Messrs. Remy and Rösing found that the products of decomposition prevented in an increasing degree the further decomposition of the substance; so that the same final degree of decomposition, was always arrived at whatever might be the intensity of the initial decomposition. It is consequently of great importance, in the comparative investigations into the power of decomposition of the various substances, not to push the investigation up to the point of this uniform degree of decomposition.

The experiments which were made for the purpose of solving the second problem that the writers had placed before them, led to the following conclusions:

1) the chemical composition of the soil exercised an undoubted influence on the process of decomposition;

2) the influence is not limited to the nutritive elements of the plants, but extends also to all the chemical components of the soil;

3) among the latter, humic acid compounds and silicates take the first place, because they are favourable to the decomposition of peptones;

4) in some soils, it appears that there exist compounds that are soluble in water, which have an unfavourable action on the bacteria that cause the decomposition of peptones.

In the experiments made in connection with the third question that the writers were dealing with, there was a loss of nitrogen in the soils treated with peptones and albumen, especially in clayeys oils. These losses are probably due to want of moisture. The intensity of the decomposition of peptone s such as albumen, both in the experiments made in the open and those made with nutritive solutions, is always in relation to the aeration. A high degree of moisture, as well as the compactness and fineness of the particles of the soil, hinders the decomposition of peptones and of albumen.

The differences which exist in this way between the various soils may largely compensate its biological influence on the decomposition of nitorgenous organic substance.

Finally, it must be remembered that whatever may be the method adopted for the determination of the decomposing power of the soil or of any bacteriological energy and activity, the results ontained are only of value for the predominating conditions of the bacteriological medium of the soil examined, and that there is a strict ratio between the life of the soil bacteria and the physical conditions of the soil.

The bacteriological analysis of the soil can therefore only indicate, in the best hypothesis, what is the bacteriological state under the conditions and at the moment of the analysis.

J. DE VERTEUIL. **Increase in Nitrates in Limed as Compared with Unlimed Soils.** - *Dept of Agric Trinidad Bull*, Vol. IX, No. 66, p. 239-240. Port of Spain, 1910. **402**

Tobago

The influence of liming on the increase in nitrates is well known, but it is seldom that such striking data have been published on this subject as those resulting from the analysis of the soils of Tobago, River Estate.

The examination of two lots of soil, one of which had been limed six weeks earlier, while the other had not been limed at all, gave the following results:

	Limed soil	Unlimed soil
Total nitrogen %	0.122	0.118
Nitrogen in the form of nitrates % . .	0.0022	0.0011

It will be seen that the liming had the effect of doubling the proportion of nitric nitrogen in the soil.

J. G. LIPMAN and P. E. CROWN. **Relation between the Humidity of the Soil and the Formation in it of Ammonia, Nitrites and Nitrates.** (Report of the Soil Chemist and Bacteriologist of the New Jersey Agricultural College Experiment Station 1909, pp. 1-105). — *Biedermanns Zentralblatt für Agrikulturchemie.* Heft 2, pp. 85-88. Leipzig, 1911. **403**

United States: New Jersey

The object of these experiments was the study of the formation of the various nitrogenous compounds in the soil under the influence of the different degrees of moisture.

The soil used was a rather compact clay, and the boxes in which it was placed contained 20, 40, 60, 80 and 100% of the water necessary for complete saturation. Samples containing the same amount of dry soil were taken out from time to time, and known quantities were taken from these samples and added to nutritive solutions containing peptones and gelatine.

The increase of the proportion of moisture in the soil had no influence at first in the formation of ammonia in the solutions containing peptones, an increase on the formation of the ammonia taking place only when the soil was completely saturated with moisture. It would seem therefore that the formation of ammonia may be attributed to the anaerobic bacteria which must predominate in such a soil.

The influence of the proportion of moisture in the soil was clearly evident in the solutions containing gelatine. The direct determination of the ammonia when the peptones were added to the soil itself and not only to the nutritive solutions containing known quantities of soil, gave analogous results.

When sugar was added, the accumulation of ammonia was no longer observed, even if the soil was saturated with moisture.

The other series of experiments, made with the same samples of soil, gave the following quantities of nitrites, expressed as NO_2 for each million parts of the damp soil:

Percentage of maximum moisture saturation in the soil	Experim. No 1	Experim. No. 2
20 %	0.538	0.987
40 »	0.385	0.825
60 »	0.642	0.398
80 »	0.174	0.514
100 »	0.247	0.091

By way of compensation, the quantities of nitric nitrogen were:

Percentage of max. moisture saturation of the soil	In 1 million parts of soil				
	Septemb. 3 1907	June 26 1908	July 7 1908	Aug. 3 1908	October 23 1908
20 %	29.0	31.6	35.9	91.5	59.4
40 »	42.3	14.2	38.0	88.2	122.3
60 »	55.2	19.3	32.2	127.5	128.0
80 »	10.8	traces	traces	traces	traces
100 »	0.3	traces	traces	traces	traces

These data seem to show that the average saturation of the absorbant power of the soil for water, when the moisture contained in the soil is from 20% to 60% of the maximum of saturation, constitutes the *optimum* for soil-nitrification.

C. v. SEELHORST. **Effect of Shade on the Evaporation from the Soil.** (Ueber den Einfluss der Beschhattung auf die Wasserverdunstung des Bodens). —*Journal fur Landwirtschaft*, LVIII-B., H., III, pp. 221-228. Berlin, 1910. **404**

Germany

These experiments were made with rye, in a clay soil placed in boxes.

From April 15th to July 30th, 1910, with a rainfall of 296.2 mm., the evaporation from the soil which was not planted amounted to 212.4 mm., or 71.7 %; that from the planted soil was 171.3 mm., or 57.8 %. At the period when the shade should have the greatest effect—from April 15th, to June 16th—(with rainfall of 140.4 mm.), the evaporation was 106.1 mm. and 70,7 mm. respectively, i. e. 75,5 % and 50,3 %. The shade therefore reduced the evaporation by 35.4 mm., or 25.2 % of the rain which had fallen.

This fact naturally is closely connected with factors such as the moisture of the soil, its mechanical composition, the kind of rain, the temperature, sunshine, the humidity of the air and the wind. As, it appears clearly proved that shade reduces the evaporation from the soil, the advantage of sowing seeds very closely cannot be denied, but if the plants grow thickly they require much water, and may exhaust the water reserve of the soil, therefore account must be taken of local conditions, especially in the case of cereals (1).

A. J. SUPRUNENKO. **Observations on the Moisture of Sandy Soils.** (Nabliudenia nad vlajnostiu cupechtchannoi poltchvi). — *Zapiski Novo-Alexandriiskago Iastituta Selskago Kosiaistva i Liseovodstva* Mémoires de l'Institut Agronomique et Forestier à Nowo-Alexandria (Gouv. Lublin). Vol. XXI, Livr. premiere. Voepusk pervii p. 1-14, St. Peterburg, 1910. **405**

Russian Empire: Poland

Mr. Suprunenko deals with a series of interesting investigations, made between April and August of 1907, on the nature of the typical sandy soils of Novo-Alexander (Lublin Gov.). These investigations are interesting in regard to the moisture of the soil.

The total rainfall during the above-mentioned period was 204.4 mm., the figures for each month being as follows:

April	24.9 mm.
May	29.2 »
June	90.0 »
July.	35.1 »
August . . .	25.2 »

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(1) Experiments by Lawes and Gilbert at Rothamsted, and by many others, have long since demonstrated the drying effect of crops. In a bare soil we have simply evaporation; but in a soil on which plants grow soil-moisture is dispersed chiefly and abundantly by transpiration through the foliage. A crop transpires about 300 lbs. of water for each pound of dry matter produced. The denser the foliage, the greater the number of plants, and the heavier the crop on a given surface, the greater is the loss of moisture by transpiration.

Compare: A. D. HALL, *The Drying Effect of Crops. The Soil*, London, 1903, p. 102. [*Ed.*].

According to investigations made at the various soil-depths, of 10, 25, 50, 75 and 125 cm., the water spreads rapidly through the whole of the stratum and determines an increase of moisture in the deepest part seven days after the rain has fallen.

AVERAGE MOISTURE.

	Depth 10 to 125 cm.			Depth 10 to 50 cm.			Depth 75 to 125 cm.		
	June		Difference	June		Difference	June		Difference
	11	3		11	3		11	3	
Potatoes. . . .	12.2	8.4	3.8	13.3	8.9	4.4	10.9	8.0	2.9
Clover	9.2	5.9	3.3	11.8	4.7	7.1	7.6	7.1	0.5
Rye and clover .	10.7	6.6	4.1	12.9	5.3	7.6	7.3	7.2	0.1
Oats	10.0	5.5	4.5	12.4	5.1	7.3	7.6	5.9	1.7
Vetch and oats .	12.7	7.3	5.4	15.4	5.3	10.1	10.0	9.2	0.8

The minimum loss, by evaporation, of 1.9 % was observed in August at a depth of 75 cm. in a soil where oats were growing. The great permeability observed, as well as the distribution of the rains, explains certain anomalies which are sometimes met with, such, for instance, as a relatively dry layer between two moister ones, or vice-versa.

The following table gives an idea of the action of the various cultivations on soil moisture:

	Average moisture of soil at a depth of						Average total	Moisture verified at the end of observation.						Average total
	10 cm	25 cm	50 cm	75 cm	100 cm	125 cm		10 cm	25 cm	50 cm	75 cm	100 cm	125 cm	
Vetch and oats .	10.3	10.1	10.1	8.9	8.1	7.8	9.2	11.8	11.2	12.5	8.6	8.1	6.8	8.7
Winter rye . .	9.4	10.4	8.4	6.6	6.3	6.4	7.7	11.5	12.7	9.2	5.2	6.0	4.2	7.4
Potatoes . . .	9.2	8.9	8.7	8.1	8.9	9.5	8.8	8.3	4.7	4.4	5.5	6.9	9.7	6.5
Clover	9.4	8.6	6.6	6.0	6.3	7.4	7.4	8.5	5.8	3.7	3.6	3.9	2.7	4.7
Oats	9.7	7.2	7.4	5.4	6.3	7.7	7.3	9.8	6.3	5.6	2.4	3.6	2.8	5.0
Rye and clover .	9.2	8.0	7.1	5.7	6.7	6.0	7.1	7.7	5.2	5.7	2.8	3.5	4.6	4.7

As will be seen, the penetration of the water was most rapid in the soil where vetch was cultivated. As to the soils where potatoes and rye were cultivated, the moisture was noticeably constant during the first period of vegetation. When the crops were gathered, however, the soil where potatoes had been grown lost the water that it contained with much greater rapidity.

TH. BIÉLER-CHATELAN. **The Rôle of Micas in Arable Land.**—*Bulletin de la Société vaudoise des Sciences naturelles.* Lausanne, 1910. Abstr. *Revue Scientifique.* Paris, Jan. 21st, 1911. **406**

Russia. Switzerland

Mr. Prianichnikow, of Moscow, has shown that the white mica which is called *Muscovite* supplies plants with potash in stronger proportions than orthoclase felspar.

According to Mr. Biéler-Chatelan, this difference can be explained by the unequal solubility of these two substances; he has found, as a matter of fact, that Muscovite mica (Muscovy glass), in more or less thin flakes, will yield as much as 0,05 $^{0}/_{00}$ of potash to distilled water, whereas orthoclase felspar, in a fine powder, gives no more than 0,02 $^{0}/_{00}$, or less than half. This greater solubility is therefore an intrinsic quality of mica, but is also due to its separation into very thin laminae, thus presenting a large surface of attack. If acids or substances which are used as fertilisers or improvers of the soil are added to the water, its solubility is further increased, as the following table shows:

Solvents	Potash dissolved
Pure distilled water	0.48 per 1000
» » + gypsum	1.02 »
» » + peat	1.05 »
» » + ammonium sulphate. . .	1.55 »
» » + quick lime	1.76 »
» » + citric acid (1 %)	1.85 »
» » + monocalcic phosphate . .	2.24 »
Concentrated hydrochloric acid.	2.90 »

These facts have a certain practical importance in relation to soils rich in micas derived from crystalline or schistous rocks. In most of these soils potash is abundant, but relatively insoluble in water, and apparently not very capable of assimilation. Indeed, some of these soils when treated with water acidified with carbon dioxide, yield much less potash than 0,2 $^{0}/_{00}$, which is, as a rule, the minimum content of efficacious potassic fertilizers. It would seem therefore that the action of the latter must be very marked. On the contrary, however, except in the case of plants that grow rapidly, such as asparagus, potassic fertilisers add nothing to the effect produced by superphosphates alone. This might be explained by a mobilising action of the superphosphates, but it also seems probable that the roots are able to use the reserve of insoluble potash of the micas (1).

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(1) See *Recherches sur la potasse assimilable des sols,* published by Mr. Biéler-Chatelan in the *Annuaire agricole suisse,* 1909. [*Ed.*].

The writer had proof of this when cultivating Ray-grass in a micaceous sand completely free from potassium soluble in mineral salts. The vegetation of this grass was normal. Its ashes contained potash, a proof that this alkali had been absorbed by the roots. As the nutritive solution used did not contain any potash after its passage through micaceous soil, it may be legitimately concluded, that the roots themselves had attacked the micas and rendered them soluble. Such an attack was in fact made manifest by the distinct adherence of flakes of mica to the roots, which surrounded them like a sheath. It is likely that the root hairs insinuated themselves between the cleavage planes.

In addition to potassium, certain micae may supply the plants with magnesia, lithium, fluorine (the lack of flourine in the soil, and consequently, in food substances, perhaps explains the bad state of the teeth observed in certain regions).

In conclusion, the writer affirms that the micas (and other aluminium minerals also) contribute to form clays as well as the feldspars, to which this important rôle has been too exclusively attributed.

To sum up, the micas in the soil have a physical well as a chemical importance. They desintegrate and give rise to clay, and they also provide some of the mineral nutrition of the plants.

By the use of fertilisers and tillage, exercising a mobilising action on the soil, a large part of the immense reserves of potassium contained in the micas may be extracted.

407 A. W. Blair and S. E. Collison. **Tanks for Soil Investigation at the Florida Agricultural Experiment Station. Experiments on Orange Trees.** —*Journal of Industrial and Engineering Chemistry*, Vol. 3, N. 1, pp. 32-33. Easton, Pa. Jan. 1911.

United States

A series of soil tanks has been set up at the Florida Experiment Station for the purpose of determining the loss of soluble fertilizers and also the effects of the prolonged use of commercial fertilizers on the soil and on orange trees.

There are four such tanks with inside diameter 5 ft 3 $^1/_4$ in. (metres 1.59), and maximum depth 4 $^1/_2$ ft (m. 1.36), constructed of heavy galvanised iron painted inside and out. The botton of each tank slopes to a point near one side, where there is a strainer opening into a two-inch drainage pipe, which connects each of the tanks with a central collecting pit, 8 ft (2 m. 41) deep and 6 ft (1 m. 81) square, with concrete bottom. The tanks were sunk in the ground to within a few inches of the top.

Over the sloping part of the bottom was placed a layer of smooth quartz pebbles, and then the soil, disposed in successive layers, as in the ground outside. The soil was well tamped as it was put in, each tank having the same weight of dry soil, 8 625 lbs. or 3 881 kgs. In each an orange tree has been planted, as well as four control trees a short distance away.

EDMUND BONJEAN. **Purification of Drinking Water.** — *Revue Scientifique*, pp. 138-146. Paris, Feb. 4, 1911. 408

France

The principal systems for the purification of drinking water at present in use are founded on the following principles:

1. *Simple filtration on submerged sand.*—With regard to these filters, the theory of the filtering membrane is now almost abandoned; there is a tendency to avoid the ripening of the biological membrane. On the contrary, clean and good filtering surfaces on the sand of the filtres are desired. Mineral membranes are preferable to biological ones.

2. *Double filtration with preliminary clearing and prefiltration.*—The methods of double filtration seem to give greater security, although the writer makes some reserves on the question of their value in times of cholera epidemic.

3. *Filter with non submerged sand.*—This system has not yet been applied for the treatment, of a large volume of surface water but this problem has been solved on a small scale at Rouen and Pontoise. The purification of subterranean water that is already partly purified by the soil is accomplished at the town of Châteaudun by this method. The French Minister of War is now having numerous trials made.

4. *Treatment by Ozone.*—This treatment is now perfected, thanks to the observations made on the large plant which has been put up. Ozone treatment is still the method preferred. By it, all adult germs are killed at a given moment of the treatment; methods with an instantaneous bactericide action always offer greater security. In France, several towns have applied the ozone processes, as Nice, Cosne, Chartres, Dinard, and Saint-Brieuc; whilst others, Paris, Saint-Servan, Laval, Avranches, etc., are about to treat a part of their drinking waters in this way. The sterilisation of the waters of St. Petersburg, Paderbor (Germany), and Hermanstadt (Hungary), etc., is done by one or other of the ozone methods.

5. and 6. *The ferro-chlorine and lime processes* are as yet very little used.—Treatment by the *ultra-violet rays* is at its beginning.

H. STABLER. **Relative Value of Irrigation Waters.** — (*Engineering News*, 1910, 64, No. 2). — *Exp. Station Record*, p. 517. November 1910. 409

United States: Texas Arizona Oklahoma New Mexico

The writer classifies on the basis of their alkali coefficients the waters of various important streams in the United States as follows:

Stream	Locality	Alkali Coefficient	Class
Rio Grande,	at El Paso, Texas.	17.0	Fair
Colorado River,	at Yuma, Texas	14.0	
Salt River,	at Roosevelt, Arizona	12.0	»
Gila River,	at San Carlos, Arizona . . .	9.2	»
Salt Fork of Red River,	near Mangum, Oklahoma . .	9.1	»
Turkey Creek,	near Olustee, Oklahoma . .	5.3	Poor
Pecos River,	near Carlsbad, N. Mexico . .	4.4	
North Fork of Red River,	near Headrik, Oklahoma . .	1.7	»
Elm Fork of Red River,	near Mangum, Oklahoma . .	0.5	Bad

410 **Irrigation in the Trans-Caucasus. (Austrian Consular Report).** (Bewasserungsarbeiten in Transkaukasien).—*Oester. Monatsschrift für den Orient.* Wien, Dez. 1910.

Russian Empire: Trans-Caucasus

The steppes of Mugan, in the Government of Baku, measure 160 000 *dessiatines* (1 dessiatine = 1.08 hectare) and those of Mill, 165 000 dessiatines; 40 000 dessiatines have so far been irrigated in the first, with water from the river "Araxes," and in the spring of this year 50 000 dessiatines more are to be put under irrigation.

The irrigation works will be terminated in four years. Twenty-six Russian villages have already been founded along the canals, and the inhabitants are beginning to cultivate cotton.

In the steppes of Mill plans for irrigation have been prepared which include the reopening of four canals used in ancient times.

411 **Irrigation in Tonkin.** — *La Quinzaine Coloniale*, N. 1, p. 8. Paris, Jan. 10, 1911.

French ido-China: Tonkin

The projected Tonkin loan provides for important irrigation works. In addition to this, an experiment field has been established in the districts of Phu-Xa and Phu-Gia for demonstrating and determining the advantages of irrigation applied to rice cultivation. The results have been most encouraging. Pump irrigation lasted 145 days, and the crop obtained by giving a litre of water per second per hectare to dry soils was on an average 1600 kg. of "paddy" and 2050 kg. of straw. This result is very satisfactory, and shows that it is quite easy to irrigate high lands which are at present unproductive, if they are near water. Water can be supplied at the fifth month at small expense by means of pumping stations.

The ground selected, which covered an area of 40 hectares, had never borne a fifth-month crop, the natives not having been able to form reserves of water. The soil was absolutely dry. Improvement consisted in the installation of a water station, furnished with a cheap and simple pump, and in the construction of two main canals with secondary canals. The filling of the water courses began on January 2nd 1910, and ceased on the 13th, when the transplanting began. On January 30th transplantation was finished, and on April 26th the rice was in flower.

Pump irrigation lasted 145 days, the whole cultural developement taking 140 days.

B. Schulze. **Cereal and Bean Stubble.** (Die Ernteruckstande der Halmfrüchte und der Ackerbohnen). *Fuhling's Landwirtschaftliche Zeitung*, J. 59, Heft 23, pp. 801-807. Stuttgart, Dez. 1, 1910. **412**

The figures generally given for the residues left in the soil by beans and cereals after the crop has been gathered vary considerably and are not reliable.

Germany

Mr. Schulze, basing his conclusions on the ratio between the subterraneous and aerial parts of a plant, estimates the weight of the first by means of the second, and, adding to this the weight of the stubble, obtains the total weight of the air dried residue, which contains from 10 to 12 per cent of water:

Kilograms of residues per hectare

Winter rye .	stubble 1247 kg.	+	roots 739 kg.	=	1986 kg.
Wheat . . .	925 »	+	1102 »	=	2027 »
Oats	» 900 »	+	» 1210	=	2110
Barley . . .	» 702	+	636 »	=	1338 »
Summer rye					2121 »
Summer wheat					1332 »
Beans					3540 »

Admitting that the residues of cereals contain on an average 0.8 % of nitrogen, there would remain in the soil:

	Kilograms of nitrogen per hectare
Winter rye	15.9
Summer rye.	17.0
Winter wheat	16.2
Summer »	10.7
Oats	16.9
Barley.	10.7

As to beans, if an average nitrogen content of 1.77 % be admitted in their residues, they leave in the soil 63 kg. of nitrogen per hectare, which is equal to the amount contained in 4 quintals of nitrate of sodium (1).

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(1) Compare with the old results of Weiske, Werner and others. Wheat stubble and root-residues were calculated on an average at 3888 kgr. per hectare, containing kgr. 26.4 of nitrogen, kgr. 20.7 of potash, and kgr. 13.3 of phosphoric pentoxide. In the case of clover and of lucerne the residues remaining in the soil are calculated at 10 000 kgr. per hectare, containing 152 to 215 kgr. of nitrogen, 41 to 90 kgr. of potash and 44 to 84 kgr. of phosphoric pentoxide. *Landw. Versuchs.*, 1871, 14, 105. E. Risler, *Physiologie et Culture du Blé*, Paris, 1886, p. 49. [*Ed.*].

413 **Mexican Guano.**—*L'Engrais*, N. 2, p. 44. Lille, Jan. 13, 1911.

A Syndicate of Californian capitalists is starting the exploitation of the guano deposits on the seventeen islands off the coast of Campeche, the total value of the guano being estimated at 150 000 000 golden piastres (755 000 000 frs). The Mexican Government has granted a ten years concession to the Company with a royalty of 0.70 fr. per ton of product extracted. **Mexico**

At first the guano will be exported to Europe, chiefly to Hamburg. According to the engineers, there would be least 5 000 000 tons of guano in the islands so far explored, and there are vast extents still to explore. The most important deposits are to be found on the Triangle, Arcas and Arenas Islands.

414 BRIOUX. **Cyanamide of Calcium.**—*Bulletin des Séances de la Société Nationale d'Agriculture de France*, N. 10, pp. 845-846. Paris, December, 1910.

Mr. Brioux points out that certain irregularities in the fertilising action of cyanamide of calcium are due to changes caused by the influence of moisture and carbonic acid. These transformations consist in polimerisation resulting in the formation of dicyandiamide and of a small quantity of more **France** or less complex nitrogen compounds, accompanied by a loss of ammonia. The fact is of practical importance, the writer's cultural experiments having once more verified the toxic effects of dicyandiamide on plants. Though containing the same amount of nitrogen as before, the altered cyanamide gives rise to very inferior crops.

If the fertiliser is kept in sacks, in a dry place, the change is less marked, the loss of nitrogen being insignificant. With an excess of moisture, on the contrary, a large proportion of ammonia is given off. The injurious effect of cyanamide as a top dressing is explained, in the writer's opinion, by the formation of the dicyandiamide; this compound is stable if left on the surface of the soil; but if the fertiliser is buried by tillage, it is brought into contact with the numerous bacteria of the soil and is subjected to ammoniacal fermentation and then to nitrification.

415 G. PATUREL. **Chemical Fertilisers and the Mineral Constituents of Hay.**—*Journal d'Agriculture pratique*, N. 1, p. 12. Paris, Jan. 5, 1911.

Mr. Paturel has endeavoured to estimate the importance of the modifications which take place in meadow hay under the influence of chemical **France** fertilizers, with special reference to the phosphoric acid, lime and magnesia, which are the principal constituents of bone, and consequently necessary in the feeding of young animals. The experiment field was divided into three lots, one plot being kept as control, the second being treated with 1000 kg. of slag per hectare, and the third with 1000 kg. of slag and 500 kg. of kainit.

The various samples from the first crop contained:

	Contiol °/oo	Slag °/oo	Slag and Kainit °/oo
Minerals	63.50	64.10	81.10
Phosphoric pentoxide.	2.63	3.76	4.74
Lime	10.9	12.3	16.0
Magnesia	3.4	3.7	4.2

By putting the results of the control at 100, the increased mineral content of the hay treated with fertilizers becomes apparent, thus:

	Control	Thomas Slag	Slag and Kainit
Phosphoric acid	100	140	177
Lime	100	113	146
Magnesia.	100	108	123

A similar study made on the second crop shows that the increase, although inferior to that of the first crop, was still remarkable.

The effect of the fertilizers on the flora of the meadow was remarkable, the leguminosae being specially favoured,

To sum up:

1) The mineral content of the first hay-cutting was found to be greatly increased by using chemical fertilizers. The increase was greatest in phosphoric oxide, there being a degree less in lime and magnesia.

2) The second crop of hay was also improved by the fertilizers.

3) The mineral quality of the hay was raised by the higher proportion of leguminosae, which increased from 20 to 60 per cent.

Phosphate Deposits in the United-States. (Phosphatlager in den Vereinigten Staaten). *Das Handelsmuseum*, p. 63. Wien, Jan. 26, 1911. **416**

United States

Extensive phosphate deposits are said to have been discovered last January in the west of Montana.

O. LEMMERMANN. **Martin Slag Containing Fluorine sold as Thomas Phosphatic Slag.** (Fluorhaltige Martinschlacken, die als Thomasmehl gehandelt werden. Verhandlungen der XXIX. Hauptversammlung des Verbandes landw. Versuchs-Stationen im Deutschen Reiche zu Hannover).— *Die Landwirtschaftlichen Versuchs-Stationen*, Band LXXIV, Heft. III-V, pp. 395-400. Berlin, 1911. **417**

Germany

Mr. Lemmermann has found that there is a slag on the market, fraudulently mis-named Thomas slag, which out of a total of 5 to 10% phosphoric pentoxide does not contain more than 1 to 2 % of phosphoric pentoxide soluble in citric acid, and also contains fluorine. This slag is really Martin slag, poor in phosphoric acid, and in which the presence of fluorine further diminishes its solubility in citric acid. For this reason it is very necessary to determine the presence of fluorine when analysing Thomas phospatic slag; and farmers should make sure that they buy the genuine article.

418 **The Importation of Superphosphates into Australia. New Official Regulations in Regard to the Guarantee of Soluble Phosphate in Australia.** (Guarantee of Soluble Phosphate in Australia).—*Mark Lane Express*, p. 65. London, Jan. 16, 1911.

Great Britain. Japan. Australia

Large quantities of superphosphate are imported from England and Japan into Australia. In the interests of farmers, the Australian authorities exercise a rigorous supervision over the importation of this fertiliser, making sure that the quality accords with the brands on the bags, and the declaration made to the Customs.

Hitherto the percentage of phosphate of lime soluble in water has been the only recognised valuable constituent in superphosphates, but by the new regulations, the guarantee may include the percentage soluble in water and also the citrate-soluble or reverted phosphate.

An allowance of $^1/_2$ % may be conceded in the declared percentage of "water-soluble," provided the "citrate-soluble" present be in excess of the guarantee to a similar extent.

419 J. Vercier. **Influence of Magnesia on the Growth of Rose Trees.** (La Bourgogne rurale).—*Le Cultivateur Vosgien*, N. 4, pp. 57-58. Epinal, Feb. 15, 1911.

France

The difficulties encountered whenever it was necessary to renew the cultivation of rose trees in the same soil are nearly always due to want of magnesia. This fertiliser is equally useful for rose trees whether in pots or in the ground. The following mixture is therefore recommended, per square metre:

1 kg. of mould;
30 gr. of bone superphosphate;
20 gr. of sulphate of ammonia;
10 gr. of sulphate of potassium;
60 gr. of sulphate of magnesium (or 80 gr. of kainit).

R. SMAGHI. **Influence of Dioxide of Manganese on Tomatoes.** (Risultati di esperienze sull'influenza del biossido di manganese sul pomodoro). — *Rivista di Agricoltura e Zootecnia,* anno III, N. 1, pp. 6-7. Barullo (Arezzo), Jan. 1911. 420

Italy: Tuscany

Mr. Smaghi has tested the efficacy of dioxide of manganese as an oxydant, on tomatoes in a soil rich in lime but subject to the formation of hard superficial incrustations which hinder the circulation of air in the soil. The experiments were carried out in Tuscany, and the results are summed up in the following table. The high production must be in part attributed to the favourable season and the great care used in cultivation.

			Tomatoes	
Plots	Fertiliser	Quintals per hectare	Ripe kgr.	Ripe and Unripe kgr.
I.	No fertiliser.		55 955	86 021
II.	Bone Superphosphate	5	63 138	85 737
III.	Dioxide of manganese	4	84 800	100 896
IV.	» »	1	39 058	58 798
V.	Bone Superphosphate	5	60 913	86 938
	Dioxide of manganese	4		
VI.	Bone Superphosphate	5	42 518	64 696
	Dioxide of manganese	1		
VII.	Gypsum	5	49 700	66 570
VIII.	Bone Superphosphate	5	64 751	87 493
	Gypsum	5		
IX.	Farm-yard manure	200	36 706	66 350
X.	Farm-yard manure	200	68 928	97 018
	Dioxide of manganese	4		

The maximum yield was therefore obtained by applying dioxide of manganese alone, in the proportion of 4 quintals per hectare; the minimum, when it was applied alone, one quintal to a hectare.

J. GYÀRFÀS. **The Harrowing of Grass-land.** (Ein Beitrag zur Frage des Eggens der Wiesen). — *Der Kulturtechniker,* XIV, J., No 1, pp. 13-14. Breslau, Jan. 15, 1911. 421

The experiments were made on water meadows at Békéscsaba by M. Gyàrfàs, Director of the Royal Hungarian Experimental Station of Agriculture.

Hungary

There were two plots of 1.175 hectares each, on which the following quantities of Grass were mown:

	1st Cutting quintals	2nd Cut. qs.	3rd Cut. qs.	Total qs.
1908. *A*) harrowed. .	24,20	14,43	10,55	49,18
» *B*) not harrowed	31,50	18 —	14 —	63,50
Difference	— 7,30	— 3,57	— 3,45	— 14,32
1909. *A*) not harrowed	11,90	31,35	12,26	55,71
« *B*) harrowed. .	10,80	31,30	12,70	55,30
Difference	— 1,10	+ 0,25	+ 0,44	— 0,41

Although these last differences are within the limits of error, it is evident that the harrowing of meadow lands is useless, if not harmful.

422 E. C. CHILCOTT. **A Study of Cultivation Methods and Crop Rotations for the Great Plains Area.** - *U. S. Department of Agr. Bur. of Plant Industry, Bull.* No. 187, p. 78. Washington, Nov. 5. 1910.

United States: Great Plains

This Bulletin contains the results of four years' experiments on crop rotation and cultivation methods, as applied to the agricultural condition of the Great Plains. The principal results were as follows:

1) Alternate cultivation and summer tillage are not recommended except in the case of extreme drought;

2) Continuous cultivation, with moisture-conservation methods, involving early autumn plowing, and thorough autumn, winter, and spring tillage, and harrowing after the grain is up in the spring, has not given average results to warrant its practice. The best results were obtained from a simple three year rotation of maize, wheat and oats;

3) When a summer tillage was introduced in place of maize, in seven out of nineteen tests the maize rotations produced better crops of wheat and oats than the summer-tilled rotations. In ten of the twelve tests where the yields of wheat and oats were better on summer-tilled rotations than on maize rotations, the yield of maize was sufficient to more than offset this difference.

The average net gain of the maize rotations over the summer-tilled rotations for all tests was $ 4.08, (20.40 frcs.) per acre, and the results were in favour of the maize rotations in seventeen out of nineteen tests.

In every place where it is possible, it is advisable to introduce some perennial grasses into the rotation (Brome-grass, *Bromus inermis*) or some perennial legumes (Lucerne, *Medicago*) or even grasses and legumes together (*Bromus* and *Trifolium*). In this case it is best to adopt a five-year rotation: maize, wheat, brome-grass or lucerne, for two or three years; oats, barley, emmer or wheat.

After the brome-grass has been mown, flax may be sown as a catch crop. When neither perennial grasses nor legumes can be raised, very good results are obtained by sowing peas, sweet clover, or rye, which is put in the ground after the harvest. Rye gives the best results probably for two reasons; first, because it contains a larger quantity of organic substance, and secondly, because it can be turned under earlier in the season, thus allowing the rains of June and July to be preserved in the soil instead of being used up in the growth of the green-manure crop.

L. J. BRIGGS and J. O. BELZ. **Dry Farming in Relation to Rainfall and Evaporation.** — *U. S. Dept. of Agric. Bureau of Plant Industry*, Bulletin No. 188. Washington, Nov. 5, 1910. 423

United States

The Office of Dry-Land Agriculture Investigations has been conducting extensive investigations since 1906 to determine the cultural methods and the systems of rotation most suited to the conditions of the Great Plains. The following is a summary of the results of these experiments, which deal with the relation between yield, method of cultivation and atmospheric precipitation:

1) With a rainfall of 8 inches (200 mm.) and less, during the period from April to July, the crops are so poor (less than 10 bushels per acre, or less than 8.7 hectolitres to the hectare) that they do not cover the expenses: the cost of wheat production per acre being considered as equivalent to the value of 9 bushels (1), at the current price of about 7 dollars. In 1904, 1905, and 1906, in the farms of Juab and Tooele, the average yield was 22 and 13 bushels respectively, which shows that it is advantageous to put the soil under cultivation.

The average annual rainfall at San Antonio, Texas, is about 26 in. (650 mm.).

The large summer evaporation and the irregular distribution of rains often cause long periods of drought. The data given in the following table show clearly the relation existing between the rainfall and the yield in Maize, Cotton and Sorghum:

	Crop		Seasonal Rainfall	Seasonal Rainfall	Annual Rainfall	Annual Rainfall
	Per acre	per hectare	inches	mm.	inches	mm.
Maize 1907 .	17.5 bush.	15.35 hl.	9.3	232.5	26	650
» 1908 .	27.4 »	24.66 »	10	250	27	675
» 1909 .	9.9 »	8.91 »	4.4	110	13	325
Cotton 1907 .	377 lbs.	422 kg.	13	325	26	650
» 1908 .	1 096 »	1 305 »	17.7	442.5	27	675
» 1909 .	640 »	716 »	9.3	232.5	13	325
Sorghum 1907 .	3.1 tons	7781 »	11.3	282.5	26	650
» 1908 .	1.3 »	3 263 »	16.4	410	27	675
» 1909 .	1.9 »	4769 »	8.2	205	13	325

2) With a rainfall of from 8 to 10 inches (200 to 250 mm.) the yield is higher in soils which have been tilled in summer than in soils tilled in the spring, as the following table shows:

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(1) The U. S bushel = 35,2 litres. — Acre = 0.405 ha. — Dollar = 5.15 fr. [*Ed.*]

	Land cropped in 1911	Land summer-tilled in 1908
Cotton	500 lbs	783 lbs
Maize	3.3 bush.	220 bush.
Sorghum	1.9 tons	5 tons
Oats	0.0 »	125 »

3) When the rainfall is more than 10 to 12 inches (250 to 300 mm.), the increase of the crop that is obtained with a summer hoeing is not sufficient to pay the increased labour.

4) With an average evaporation of 42 inches (1050 mm.) during the summer, the minimum precipitation necessary to make the cultivation of the lands in the Great Basin profitable is about 13 inches (325 mm.).

424 VON WEINZIERL. **Germinative Power of Clover Seed from Eastern Europe.** (Ueber die Keimfähigkeit osteuropäischer Kleesaaten). -- *Wiener Landwirtschaftliche Zeitung*, 61 J., No. 3, p. 23. Wien, Jan. 11, 1911.

Austria

The investigations carried out during the last fifteen years at the Vienna Seed Control Station, on samples of red clover seed, have given the following averages:

Germinative power	88.8 %
Hard seeds	8.2 %

As the samples from Russia and East Galicia contained a much higher percentage of hard seeds than those from other parts, Dr. v. Weinzierl is of opinion that the limit of the germinative power ought to be lowered for the former to 80 % and for the latter to 85 %.

425 W. MÜLLER. **Seeds of Leguminosae with Hard Integuments.** (Ueber hartschalige Kleesamen). -- *Bericht der Grossh. Badischen Landwirtschaftlichen Versuchsanstalt Augustenberg über ihre Tätigkeit im Jahre 1909*, pp. 115-122, in-8. Karlsruhe, 1910.

Germany

There is sometimes among seeds of leguminous forage plants such as clover and lucerne, a large percentage which do not germinate, because their integuments are not sufficiently permeable to absorb the quantity of water necessary for germination. This occurs more markedly in some years in the same species and in the same locality, being mainly due to excessive drought. The older the seeds, the more liable they are to suffer. Seeds with impermeable integuments will germinate if kept for some time (2 months) in a moist atmosphere, or if submitted alternately to higher and lower temperatures (6 hours at 30° C, 18 hours at 20° C), or even if the two treatments are combined. Practically good results are obtained by keeping the seeds in water at 30° C or 40° C for from 5 to 7 hours. The faculty of germination thus acquired sometimes disappears within a month.

In addition to the above methods, the writer made some experiments with clovers and lucerne seeds, submitting them to the action of a machine which split their integuments, immersing the seeds in concentrated solutions of sulphuric acid, or submitting them to etherisation. The results, however, were negative, though by the use of the warm water method a considerable percentage of the seeds germinated.

W. STORMFR. **Experiment with Beet Seeds previously treated with Carbolic Acid or with Water.** (Ein Aussaat Versuch mit vorbehandelten Rübensamen). — *Blätter für Zuckerrübenbau*, XVIII J., N. 11, pp. 1-5. Berlin, Jan. 15, 1911. 426

Germany

This experiment was made on 7 perfectly equal plots of ground, each receiving exactly 24 grams of seed. The following table describes the treatment, and the results obtained when the crop was gathered on September 2nd, 1910.

No. of plot	Method of treatment	Date of Sowing	No. of plants which germinated	Weight of crop grs.	Weight of each p'ant grs.	Relative weight
1	Seed not treated	7 VII	193	314	1.63	1.00
2	Treated with carbolic acid $^1/_2$ % .	7 VII	333	1482	4.45	2.79
3	Soaked in pure water	7 VII	517	4110	7.95	4.88
4	Treated with carbolic acid $^1/_2$ % .	9 VII	228	1288	5.65	3.47
5	Soaked in pure water	9 VII	381	2991	7 85	4.81
6	Treated with carbolic acid $^1/_2$ % .	11 VII	163	783	4.80	2.94
7	Soaked in pure water	11 VII	308	2405	7.80	4.78

Mr. Störmer's conclusions are as follows:

1) Under the given conditions (late sowing, and abundance of flea-beetles, *Haltica oleracea*), the seeds that had not been treated developed so badly that in practice the field would have had to be ploughed up.

2) The seeds treated with carbolic acid gave the best results when they were sown on the following day; but the yield was again entirely worthless.

3) The seeds which had been soaked in water for 20 hours grew vigorously, and offered great resistance to the flea beetles.

4) The most satisfactory results were obtained when the seeds had been sown the day after the application of the water treatment.

427 D. FROMBLING. **On the Relation of certain Diseases in Conifers with the Origin of the Seed.** See No. 631, in this Bulletin.

428 H. QUANTE. **Methods of Weighing Cereals and their Importance.** (Die Gewichtsverhaltnisse der Getreidekörner und ihre Bedeutung. — *Fuhling's Landwirtschaftliche Zeitung*, 60 J. Heft 1, pp. 1-28. Stuttgart, Januar 1, 1911).

Germany

The most important basis for judging the value of a seed is its absolute weight (weight per 1000 seeds); whence a direct conclusion may be deduced as to its germinative capacity and the quantity of reserve stuff it contains.

The specific weight, on the contrary, gives no idea of the absolute weight of the seeds, nor yet of their chemical nature, and is of no use except for determining the greater or smaller density of the grain. It is only when cereals of the same species and origin are in question that use may be made of the specific weight as well as the absolute weight, as an index of valuation; but as this method requires technical knowledge, it has not found its way into practice.

The weight in volume partly depends on the same factors as the specific weight, and also partly on the form of the seeds; because shrunken seeds of poor quality decrease the weight in volume. For valuation, the determination of litre weight—a very easy process—may within certain limits be employed together with the thousand-seed weight, but only when the cereals are of the same species and origin.

429 J. W. T. DUVEL. **A Moisture Tester for Grain and other Substances and How to Use it.** — *U. S. Dep. of Agric. Bureau of Plant Industry*, Circular No. 72. November 29, 1910.

United States.

This circular has been prepared in order to provide specific instructions for making moisture determinations in different substances and to bring about more uniformity in the use of the apparatus described. The use of this moisture tester with maize has resulted in more attention being paid to the proportion of dry matter contained therein, and already considerable quantities of maize are being sold on a percentage statement of moisture or on grades in which the percentage of moisture is limited, and it is believed that the time is not far distant when this will be the universal practice.

The apparatus described was developed by Mr. Brown and Dr. Duvel of the Bureau of Plant Industry of the U. S. Department of Agriculture, and has been patented by them in order to secure its free use by the people of the Union.

The method consists in heating whole grains, seeds, spices, or other similar substances in a mineral oil having a flashing point much above the boiling point of water, in condensing the water which distills off, and in collecting and measuring it in a suitable graduate. A single moisture determination can be made in twenty-five or thirty minutes, and with a six compartment tester, six tests can be made in approximately the same time.

In addition to the rapidity with which moisture determinations can be made by this method, it is especially valuable in testing substances which have a large percentage of water, are difficult to grind, or contain such large quantities of volatile oils that determinations based upon differences in weight during drying are unreliable. This method also obviates the grinding of samples, thus eliminating the loss of water which accompanies the grinding of material with relatively high moisture content.

Field-crops. — Industrial Crops. — Horticulture. — Arboriculture.

DENAIFFE. **New Varieties of Wheat and Oats.** — *Journal d'Agriculture pratique*, No. 6, 9, p. 182. Paris, Feb. 1911. 430

France: Ardennes

Mr. Denaiffe, of Carignan (Ardennes), mentions two new varieties of cereals which have been obtained in his experiment field. One of these is a *Hybrid Way wheat with red ears and red grains*, a new vigorous hybrid, hardy and very productive. The straw is white and is very resistant, the grain is red, large, and of good quality for milling. It is a semi-late variety and should be sown in autumn, and is not at all exacting as to soil.

The *White Cluster, Oats resistant to laying*, the result of crossing with the *Tartar King* oats, are a very early variety, with a remarkably rigid straw; the yield is very high.

E. AZIMONTI. **Triticum Turgidum in Southern Italy.** (I grani turgidi nel Mezzogiorno d'Italia). — *Almanacco agricolo italiano*, pp. 284 (33-37) in-8°. Piacenza, 1911. 431

Italy

The *Triticum turgidum* varieties of wheat are never laid, because they have very strong stalks; they are peculiarity adapted for utilising the abundant reserve products afforded by artificial meadows treated with chemical fertilisers. They ripen slowly, which insures a high yield in rich soils and in cool and well-ventilated situations, and they are able to support sudden changes of temperature, both in the soil and in the air. On account of these advantages, *T. turgidum* should be considered as the basis for the systematic cultivation of cereals in the Southern Appennines.

The most esteemed variety of these wheats is the red one, called *serpentina* or *rutundiello* in the country. The ripe ears are short, because the spikelets are very close together, but they contain no less than 50 grains each, of a rounded shape, and equal in transverse and longitudinal diameter.

In the Appennines, and especially on the Adriatic slope from the Molise to the province of Avellino, in Calabria, and in Sicily, land which is practically flat is frequently found at altitudes varying between 600 and 1200 metres (the slope does not exceed 5 to 10%). Where the soil is sufficiently deep and fertile, or is fertilised, the *turgidum* varieties of wheat may be grown with perfect success. The cultivation of cereals gives better results here, than can be obtained from soils of equal agricultural value situated at a lower level, and where the climate is unfavourable to wheat though particularly suitable to the olive, the almond and citrus fruits. It is therefore a mistake to discourage the cultivation of cereals in the sub-mountainous zone of the Southern Appennines.

432 G. PAMMER and E. FREUNDL. **Barley Experiments with Selected Varieties from Different Districts.** (Vergleichende Gerstenanbauversuche mit Zucht- und Landsorten). — *Wiener Landwirtschaftliche Zeitung*, 61 J., N. 2, pp. 10-11. Wien, Jan. 7, 1911.

Austria

These experiments were made to determine the value, for barley production in Austria, of the celebrated varieties obtained in the three private selection stations of Kwassitz, in Moravia, Nolc-Dreger at Chlumetz A. C. in Bohemia, and Loosdorf in Lower Austria. The experiments were carried out on various estates in accordance with the usual rules, 300 kg. of superphosphates being added per hectare. The average results for the three years 1908-1910 were:

Variety	Experimental crops				Ordinary crops				Surplus Yields of the Exper. in the 3 years average
	Grain Yield per hect.	Weight per hectol.	Absolute weight	Subjective Valuation in points	Grain Yield per hect.	Weight per hectol.	Absolute weight	Subjective Valuation in points	
	qls.	kg.	gr.		qls.	kg.	gr.		qls.
Thaya	25.9	63.9	40.2	14.3	23.0	61.8	40.9	10.6	+ 2.9
Zaya	28.8	66.0	38.2	15.0	24.6	63.5	42.8	11.6	+ 4.2
Hanna	23.9	62.8	40.7	11.9	23.0	61.8	40.9	10.6	+ 0.9
Allerfrüheste . .	25.2	62.2	38.9	10.7	23.0	61.8	40.9	10.6	+ 2.2

Other experiments were made on acclimatisation, the selected varieties already introduced being compared for one or two years with the varieties' cultivated locally. The average results were:

ACCLIMATISATION EXPERIMENTS WITH LOOSDORV BARLEY AT TULLN, LOWER AUSTRIA.

Variety	Experimental crops				Ordinary crops				Difference in Yield between the Select. and Ordin. Var.
	Grain Yield per hect.	Weight per hectol.	Absolute weight	Subjective Valuations	Grain Yield per hect.	Weight per hectol.	Absolute weight	Subjective Valuations	
	qls.	kg.	gr.	Marks	qls.	kg.	gr.	Marks	qls.
Thaya	19.4	62.6	37.9	12.3	16.7	60.9	36.6	9.6	+ 2.7
Zaya	19.6	61.3	36.8	12.7	15.7	60.6	37.8	9.3	+ 3.9
Laa and Ideal. .	14.2	61.7	39.8	10.6	12.1	60.8	38.4	10.1	+ 2.1

Taking account of the great meteorological variations during the three years of the experiments, 1908, 1909 and 1910, the superiority of the selected over the ordinary varieties is evident; of the former those specially noticeable are: the *Thaya*, *Zaya* and *Laa* of Loosdorf.

A. I. MALZER. **Varieties of Malt Barley in Russia.** (Pivovarennie iatecmeni v Rossii i nastoiastceie Polosenie ikh v Khosiaistvie i v otpusknoi Torgovlie. Trudi Biuro po prikladnoi Botaniki 1910, G. N. 1-1-80).— *Journal Opetnoi Agronomii* (Journal of Experimental Agriculture). God. XI, Kniga, 6, p. 920. St. Peterburg, 1910. 433

Russia: Caucasus Saratow

Mr. Malzer insists on the necessity of adopting better systems in the cultivation of malt barley in Russia. Several varieties are grown in Russia the protein content of which is less than 12 %; they are consequently suitable for the requirements of the European market.

There are three zones of production:

1) The Transcaucasian zone, where *Hordeum vulgare pallidum hibernum* is cultivated. This quality of barley, which has already given good results in America, is particularly well adapted to the continental climate of the Caucasus and of Central Asia.

2) The Western zone, where *Hordeum erectum* is cultivated.

3) The Government of Saratov, where *Hordeum nudum* and *H. disticum nutans commune* are grown.

Early sowing and abundant nitrogenous manuring are recommended.

434 TRABUT. **Black Barley in Algeria.** *Bulletin des Séances de la Société Nationale d'Agriculture de France*, N. 10, Dec. 1910, pp. 889-890.

Black barley, which is extensively cultivated in Persia, in the Caucasus and in Abyssinia, has been successfully introduced in the semi-arid regions of California and Australia; whence its well-known name: "Australian black barley."

Persia.
Caucasus.
Abyssinia.
California.
Algeria.

In 1893, Dr. Trabut experimented this barley at the Agricultural School of Rouiba, Algieria. The yields were large, but all the animals of the farm refused to eat the new food.

In the Constantine district the settlers have adopted this variety simply because it is more resistant; its yield is great, especially in dry years. It is also an early variety, and the animals have ended by eating it. It has become less black than when introduced.

There is another variety of black barley which Kornicke named *Hordeum Ciorhynchum*, the beard of which, unlike all the other known varieties is perfectly smooth. Experiments made for two years past in the Chéliff at Orléansville, have shown that this variety is very early and drought resisting. Mr. Trabut is of opinion that this barley should be cultivated in the plains bordering on the steppes.

435 H. SCHOLZ. **Influecne of Fertilisers on six Varieties of Barley and Oats.** (Versuche uber den Einfluss der Düngung auf 6 Sorter von Gerste und Hafer). — *Fühling's Landwirtschaftliche Zeitung*, 60 J., 3 H., pp. 83-103. Stuttgart, Feb. 1, 1911.

Germany.

The study of the question whether various species and varieties of plants act differently in regard to fertilisers has so far only led to negative results. In order to solve the problem, the following experiments were carried out with six different varieties of barley and oats:

Varieties of Barley: *Franken* (*nutans* α), *Goldthorpe* (*erectum* γ) early, *Loosdorfer* (*erectum* α) brilliant, *Sv. Prinzess* (*nutans* α), *Nolc Imperial* A (*erectum* α), *Nolc Imperial* B (*erectum* α).

Oats: *Fichtelgebirg* (white), *Leutewitser*, *Petkuser*, *Sv. Goldregen* (yellow) *Alb* (white), *Schlanstedter* (white).

Composition of the soil: phosphoric acid, 0.064 %; potash 2.548 %; carbonate of lime 11.58 %; a stiff clay, not very permeable.

Manure per are: 3 kg. of Thomas slag and 1 kg. of nitrate of sodium.
Experimental plots, 1 are in area, with 3 control plots of 2 m^2 each.
Seeds sown in rows, 20 × 5 cm.

Results on the basis of the maximum crops and relative analytical characteristics of the plants:

BARLEY.

Variety manure	Total crop gr	Number of plants	Total weight per 100 plants gr	Stems per 100 plants	Total weight per 100 stems gr	Percentage of caryopses
Franken:						
Not manured	1480	127	1170	500	234	41.8
manured . .	2370	154	1540	735	209	42.7
difference .	+60%	+21%	+32%	+47%	−11%	+2%
Goldthorpe:						
Not manured	1280	130	985	386	256	44.5
manured . .	2220	170	1310	506	258	45.1
difference .	+73%	+31%	+33%	+31%	+1%	−1%
Loosdorfer:						
Not manured	1500	116	1290	491	264	48.6
manured . .	2170	161	1350	583	280	44.3
difference .	+45%	+39%	+5%	−2%	+6%	+4%
Prinzess:						
Not manured	1610	130	1160	458	253	38.5
manured . .	2340	147	1590	690	231	41.0
difference .	+45%	+6%	+37%	+51%	−9%	+7%
Nolc I. A.:						
Not manured	1230	126	980	362	270	43.9
manured . .	1890	136	1390	524	266	42.3
difference .	+54%	+8%	+42%	+45%	−1%	−4%
Nolc I. B.:						
Not manured	1450	114	1270	379	336	45.5
manured . .	2590	170	1530	452	338	42.5
difference .	+78%	+49%	+20%	+19%	+1%	−7%
OATS.						
Fichtelgebirg:						
Not manured	1490	131	1130	306	372	32.0
manured . .	2440	149	1640	382	430	43.0
difference .	+64%	+14%	+45%	+25%	+16%	+2%
Leutewitzer:						
Not manured	1720	124	1390	246	565	41.0
manured . .	2490	146	1710	294	580	46.0
difference .	+45%	+18%	+23%	+20%	+3%	+12%

BARLEY.

Variety manure	Total crop gr.	Number of plants	Total weight per 100 plants gr.	Stems per 100 plants	Total weight per 100 stems gr.	Percentage of caryopses
Petkuser:						
Not manured	1510	135	1120	257	435	45.0
manured . .	2600	155	1680	342	400	47.0
difference .	+72%	+15%	+50%	+33%	+13%	+7%
Goldregen:						
Not manured	1910	130	1470	230	641	41.0
manured . .	2870	156	1840	289	638	44.0
difference .	+50%	+20%	+25%	+26%	—0.5%	+7%
Alb:						
Not manured	1760	136	1290	206	630	45.0
manured . .	2580	149	1730	250	695	47.0
difference .	+47%	+10%	+34%	+22%	+10%	+5%
Schlanstedter:						
Not manured	1500	115	1300	184	708	38.1
manured . .	2480	141	1760	235	750	40.0
difference .	+65%	+23%	+35%	+28%	+6%	+5%

436 **Experiments with Barley and Hops in Italy.** (Esperimenti di coltura in Italia di orzo e di luppolo da birra). — *Gazzetta agricola*, Anno XXIV, N. 5, 29 gennaio 1911. Milano.

Italy: Friuli

The consumption of beer increases every year in Italy, and while the importation remains stationary, and the exportation is practically *nil*, the manufacture of Italian beer has made great strides. In 1908, Italy imported 88 093 hectolitres, and 477 493 hectolitres were brewed in the country; these figures had risen considerably in 1909. The barley and hops used by the brewers, however, come from Austria and Germany. In 1908, 11 768 tons of malt barley were imported into Italy, for a value of more than 2 000 000 frs., (£80 000) while about 500 000 frs. (£20 000) worth, or 1500 quintals, of hops were imported.

The Agricultural Association of Friuli now proposes experimenting the local production of hops and malt-barley. A variety of German malt barley has already been very successfully grown at Varese. In Umbria, near Perugia, Count Claudio Faina has been growing hops with success.

437 M. Pankov. **Variations in the Composition of Stacked Straw.** (Izméneniia v sostavie solomi pri Kranenii v ometie)—*Sapiski-Novo-Aleksandriiskago Khosiastva i Liesovodstva.* (Memoires de l'Institut agronomique etforestier à Nowo-Alexandria (Gouv. Lublin). Livr. première, Vol. XXI, pp. 45-48, N. 1. St-Peterburg, 1910.

Russia

Straw kept for a certain time (3 months) in a well constructed and well-exposed stack, is subject to alterations, of which the following are the most important:

1) Decrease in the height (10.0°/o) and in the volume (11.04 °/°) of the stack.

2) A loss of 16.11 °/o of dry matter, which drops from 82.47 °/o to 66.36 °/o.

3) Losses of non-nitrogenous extractive constituents.

4) An average loss of 11.47 °/o of ash.

5) In the chemical composition of the ash, a decrease in silica, lime, magnesia and chlorine is noticeable, while there is an increase, on the contrary, in the proportion of sulphates and phosphates.

J. Fixter. **Corn for Ensilage: Cultivation and Cost.** — *The Farmer's Advocate*, p. 2043. London, Ontario, Dec. 22, 1910. **438**

The following figures give the cost of producing maize silage on the Mac Donald College Farm:

Canada: Ontario

34 acres (13.6 hect.) yielded 640 tons, or 57,98 met. qts.

Rent of land 4 dollars per acre (50 fr. 70 per hect.)	dollars	136	(fr. 700,40)
Manure, 18 tons per acre (qt. 403 per hect.) 1/3 charged to each crop at 6 dollars per acre (fr. 73.90 per hect.)	»	204	(fr. 1050,06)
Ploughing, 23 days at 3 dollars per day (15 fr. 45)	»	69	(fr. 355,30)
Disk harrowing and harrowing 8 days.	»	24	(fr. 123,60)
Seed, 17 bushels (hectol. 5,98) at 1.50 dollars per bushel (fr. 21.90 per Hl.).	»	25	(fr. 131,70)
Sowing and planting	»	18	(fr. 92,70)
Cultivating 6 times	»	66	(fr. 339,90)
Hoeing and thinning 43 days at 1.50 dollars (7 fr. 72)	»	64	(fr. 329,60)
Cutting with binder 10 days at 3 dollars (fr. 15,45)	»	30	(fr. 154,50)
Twine, 204 pounds at 11 cents (92 kg. 40 à 1 fr. 24 per kg.)	»	22.44	(fr. 115,50)
Teams drawing to silo 34 days at 3 dollars (15 fr. 45)	»	102	(fr. 525,30)
Men, loading, unloading and tramping, in silo, 115 days at 1.50 dollars (fr. 7.72)	»	172,50	(fr. 887,80)
Use of engine and cut-box 10 days at 7 dollars (fr. 36,05)	»	70	(fr. 360,50)

Use of general farm machinery at 30
cents per acre (3 fr. 80 per ha) . . dollars 10.20 (fr. 52,50)
Total crop: 640 tons (ql. 5798).
Total cost . . . . » 1013.64 (fr. 5218,24)
Cost per ton: 1.58 dollar (per ql. fr. 0,90).
Yield per acre: 18 tons 1657 lbs. (ql. 404,90 per ha).

439 **To Increase Maize Crop in the United States.** — *Modern Miller.* St. Louis, December 24, 1910.

United States

The U. S. Department of Agriculture has issued a Bulletin on maize cultivation, in which the assertion is made that it is possible within a few years to double the average production of maize per acre in the United States, without any increase of work or expense. It is not to be understood from this statement that it is desirable to double the present maize crop, but to produce the same yield on a smaller number of acres and with less labour.

The average production per acre has been 26 bush. (23 hectol. per ha.). Few farmers would like to acknowledge that their average production for the past ten years has been as low as 26 bush. per acre, but from the best estimates the conclusion is unavoidable that half of those who grow maize harvest less than 26 bush. per acre. Twice this quantity is a fair crop, three times 26 bush. is a good crop, and four times 26 bush. per acre are not unfrequently produced.

440 C. K. Francis. **Sorghum or Kaffir Corn** (1). — *Monthly Press Bulletin, Oklahoma State Board of Agriculture*, No. 10, p. 2. Guthrie, Dec. 1910.

United States: Oklahoma

Investigations were undertaken in the Chemical Department of the Oklahoma Agricultural Experiment Station, to determine the value of kaffir corn (1) as food and as raw material for the manufacture of alcohol, starch, syrup and oil.

These tests show that kaffir corn contains about one-third as much digestible matter as average corn and cob meal. Kaffir corn which had been soaked for twelve hours was found to be less digestible than when fed dry to steers. It pays to grind kaffir corn, for one hundred pounds of kaffir meal contain as much digestible matter as one hundred and fifty pounds of kaffir corn. The amount of digestible matter was increased by 13 per cent when kaffir fodder was threshed, the grain ground and fed to steers along with the shredded stover.

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(1) *Sorghum vulgare*, Pers. = *Andropogon Sorghum* Brot., the same as *Durra*. Conf. *Index Kewensis*. tom. I-II. [*Ed.*].

The conclusions may be summarised as follows:

The kaffir kernel ranks close to maize as a food. Alcohol and glucose can be prepared more cheaply from it than from maize. It is believed that the fat of kaffir corn will prove valuable as a food and for the manufacture of soaps and certain fatty acids.

Kaffir corn removes a smaller quantity of the important plant foods from the soil than does maize. It is an excellent crop for semi-arid regions.

A. B. **Introduction of African Gramineae into Italy.** (Graminacæ eritree in Italia. *Agricoltura Coloniale.* Abstr.). — *Rivista tecnica e coloniale di Scienze applicate*, N. 1, p. 9, Napoli, Genn. 1, 1911. **441**

Italy: Calabria Maremma

The introduction into Calabria of "durra", or Indian or Kaffir Sorghum (*Andropogon Sorghum*), has given very good results so far. It furnishes excellent food for cattle as well as horses, and owing to its high sugar content it imparts an excellent taste to milk. It may be mixed with oats and bran. It is to be hoped that an attempt will be made to introduce this plant into other regions where the absence of water makes the cultivation of lucerne impossible.

In the Maremma of Tuscany several Gramineae from Eritrea, in addition to the "durra", have been successfully cultivated, such as "Bultuc" (*Pennisetum spicatum*), "Taff" (*Eragrostis abyssinica*, Lk.) and "Dagussa" (*Eleusine coracana*, Gaertn).

S. Apostol. **Rice Growing in the Philippines.** — *Philippine Agricultural Review.* Manila, N. 11, Vol. 3, Nov. 1910. **442**

Philippines

In the Philippines two very common ways of growing upland or non-irrigated rice, *caiñgin* and *sábog* are the following:

Caiñgin. The planters make holes in the ground with sticks and sow 10 or 20 grains of rice in each hole, which is too many. In most cases, with good seed, and under favourable weather conditions, from four to seven grains in holes about fifteen centimetres apart will be sufficient.

Sábog. At the beginning of the rainy season, the land is fenced with bamboo, ploughed once more, harrowed, and the seed sown broadcast. Some farmers prepare their fields fairly well with the aid of a roller and a harrow. After sowing, the field is harrowed lightly to cover the seed. This completes the sowing and generally no further work, such as weeding or irrigating, is done until the crop is harvested.

443 J. B. H. & F. A. S. **Rice Experiments in British Guiana in 1910.** — *The Journal of the Board of Agriculture of British Guiana*, Vol. IV, N. 2, pp. 107-108. Demerara, October, 1910.

British Guiana

These cultivation experiments were made with different varieties of rice, and they gave the following results, from the point of view of production, during the 5 years from 1905 to 1910 loth inclusive.

Varieties	Bags of 120 lbs. of Paddy per acre	Per cent, on that of the Creole
Créole.	35.8	100.0
Suthrà dhán (*N. 75*).	37.1	103.6
N. 6	38.0	106.1
N. 3 . , ...	39.3	107.8

As regards the manurial experiments as the soil was too rich, no absolutely trustworthry results were obtained. There were, however, strong indications that as the land gets somewhat poorer manuring with nitrogenous materials will prove advantageous.

444 **Continuous Cultivation of the Same Variety of Potatoes.** (Seed Potatoes Report of the Horticulturist). — *Experimental Farms Report, Dept. of Agric.*, Ottawa, Canada, 1910.

Canada: Ontario

The same varieties of potatoes have been cultivated year after year on the Ottawa Experimental Farm, in sandy-loam soils very similar in consistency. A selection was made each year of the best seed potatoes, and the results obtained seem to justify the continued use of the same stock.

Taking the results from four well known varieties, for example, the average yields were the following, for the first 4 and last 4 of the 16 years (1890-1905) during which there was no change of seed:

Name of the variety	1890-1893 Bush. per acre	1902-1905 Bush. per acre	Increase in bush. per acre
Early Rose . . .	257	317	60
State of Maine. .	325	361	36
Empire State . .	301	338	37
Delaware	296	352	56

445 DENAIFFE. **Turkestan Lucerne.**—*Journal d'Agriculture pratique*, N. 3. pp. 82-85, Paris, Janv. 19, 1911.

France

Results of investigation on the value of a new leguminous forage plant which begins to appear on the markets under the name of "Russian Lucerne" or "Turkestan Lucerne" and for which very special qualities are claimed. From the botanical point of view, the Turkestan Lucerne is not a species distinct from the ordinary cultivated lucerne, but rather a variety of the latter, *Medicago sativa* var. *rotundifolia.* When subjected to rigorous control in the experiment fields, the Turkestan lucerne was observed to differ from the cultivated kind in organic structure, leaves and seeds, as well as in its mode of growth, and aptitude for cultivation. The leaves of the Turkestan variety are rounder and smaller, the seeds are shorter, rounded at the extremities and of a very light colour. The growth of this lucerne is more rapid during the first year than that of the ordinary variety, but it has more slender stems; on the other hand, the tap-root of the cultivated lucerne is fleshy, while that of the other is thin. The crop of Turkestan lucerne is more abundant the first year, but its inferiority becomes manifest later on being neither durable nor productive. It is a very hardy plant, resistant to cold and frost.

J. J. THORNBER. **Experiments with Drought-resistant Forage Plants.** — (*Arizona Sta. Rpt., 1909*, pp. 575-580). — *Experiment Station Record.* No. 7, p. 633. Washington, December 1910. **446**

United States: Arizona

At the Arizona Station *Opuntia phaeacantha* and *Opuntia mamillata* have been discarded from the list of economic cacti because of their slow growth. The planting of cuttings was continued with 100 plants each of *Opuntia fulgida, O. spinosior, O. arbuscula, O, discata, O. linguaeformis* and *Opuntia sp.*

Experiments were continued with *Andropogon Torreyanus, Chloris virgata, C. Gayana,* and *Sporobolus airoides* in the hope of developing promising forage and hay plants.

P. KOENIG. **Forage Experiments in Mauritius.** — *Colony of Mauritius. Annual Report on the Forests and Gardens Department for 1909*, in-4°, p. 11. **447**

Mauritius

The experimental cultivation of forage crops on a small scale was started at Curepipe Station in view of determining what plants, in the hot and damp climate of Mauritius, could alternate with forest seedlings in nurseries. The experiment was conducted with cowpeas (*Vigna Catjang*), Mauritius Velvet Bean (*Mucuna atropurpurea*) or Pois Mascatte, Pois d'Achery, Pois Sabre (*Canavalia ensiformis*) and Lucerne. Only Pois Sabre gave satisfactory results.

Among fibre plants, *Boehmeria nivea* grows very slowly; *Phormium tenax* has as yet been cultivated only for ornamental purposes.

448 H. SVOBODA. **Manuring Experiments in Alpine Pastures in Carinthia.** (Die Alpen Düngungsversuche in Kärnten. Das Jahr 1909). — *Zeitschrift fur das Landwirtschtliche Versuchwesen in Oesterreich*, XIV J., H. 1, pp. 39-58. Wien, Jan. 1911.

Austria: Carinthia

The following are the results of experiments begun in 1908 on 11 alpine pastures with very poor soil on limestone rocks (*Kalkgebirge*) and on primitive rocks (*Urgebirge*):

RESULTS FOR 1908 (QUINTALS PER HECTARE).

Plot	Grass	Average	Hay	Average	Dry matter	Average
Without manure . . .	8.0 to 77.6	= 33.6	3.2 to 17.2	= 9.[illegible]	2.3 to 13.7	- 7.[illegible]7
Farm yard » . . .	46.4 » 135.6	= 72.7	13.5 » 52.6	= 21.[illegible]	11.7 » 7.7	18.[illegible]
Artificial » . . .	41.8 » 124.7	= 74.05	17.1 » [illegible]	= [illegible]	14.0 » 7.[illegible]	[illegible]7
Farm yard » + art. .	80.6 » 93.7	= 88.9	21.[illegible] » 42.4	= [illegible]	17.1 » 37.3	[illegible]4.7

RESULTS FOR 1909.

Plot	Grass	Average	Hay	Average	Dry matter	Average
Without manure . . .	4.2 to 114.8	= 35.2	1.22 to 30.31	= 11.0	1.1[illegible] to 25.03	[illegible]
Farm yard » . . .	19.2 » 122.6	= 72.0	7.30 » 51.0	= 26.0[illegible]	5.01 » 47.0	= 20.1[illegible]
Artificial » . . .	11.0 » 103.8	= 57.3	3.89 » 41.82	= 17.95	3.34 » 30.56	- 13.8[illegible]
Farm yard » + art. .	54.2 » 204.9	= 108.7	13.87 » 69.6	= 30.01	10.79 » 45.5	= 22.1[illegible]

Taking 100 as the crop in the unmanured plots the following are the averages:

Plot	Grass		Hay		Dry matter	
	1908	1909	1908	1909	1908	1909
Without manure. . . .	100	100	100	100	100	100
Farm yard »	216	205	226	[illegible]	[illegible]	[illegible]
Artificial »	220	16[illegible] (202)	240	16[illegible] ([illegible])	[illegible]	1[illegible] (187)
Farm yard » + art. .	265	309	[illegible]	7[illegible]	[illegible]	[illegible]

The figures between brackets represent the average values, no account being taken of a plot which was found to be in a very unsatisfactory condition in 1909.

In any case, it is obvious that the action of farm yard manure is superior to that of artificial manure in the second year of application. Although the crops obtained on the mountains are less than those grown in the valleys, these experiments have caused a notable increase in the yield, and have demonstrated the prolonged after-effect of the manures.

449 U. VARVARI. **Experiments with Cotton Varieties.** (Esperienza sulla cultura di alcune varietà di cotone). — *Il Coltivatore*, fasc. 570, No. 3, pp. 81-84, Casale Monferrato, 30 gennaio 1911.

Italy: Sicily

Mr. Varvari emphasises the importance of cotton cultivation for Sicily, and the necessity of improving the production. He gives the results of a cultivation experiment made in the province of Girgenti with seeds from the Botanical Garden of Palermo, in a calcareous-clay soil. The preceding crop was wheat, the rainfall scanty.

The results obtained for 1 hectare, were:

	Seeds	Cotton
Caravonica Wood .	— kg.	— kg.
Mitafifi	426.80 »	163.40 »
Biancavilla . . .	470.37 »	184.— »
Mississippi . . .	239.— »	69.50 »

The *Caravonica* gave absolutely negative results. The other varieties, according to the estimate made by the Feo cotton works at Catania, gave the following results for the raw product:

	Cotton Price per ql.	Seeds Price per ql.	Returns per hectare
Mitafifi. . . .	200 fr.	5 fr.	348.15 fr.
Biancavilla . .	160 »	5 »	317.95 »
Mississippi. . .	150 »	5 »	116.30 »

T. H. Kearney. **Breeding New Types of Egyptian Cotton in the United States.**— *U. S. Dept. of Agr., Bur. of Plant Industry*, Bull. N. 200, pp. 7-37, Washington, Dec. 23, 1910. 450

United States

A summary of the results obtained with some varieties of Egyptian cotton, acclimatised and cultivated in the South-West of the United States. These results are very satisfactory; the samples of fibre submitted to the examination of experts have not been found in any way inferior to imported products of the first quality.

The Yuma and Somerton varieties may be considered as mutations of the Mitafifi from which they have originated. The third type, (strains 360, 361, 362) is the Mitafifi acclimatised and improved; it gives a better and more abundant product than plants grown in the same region from imported seed. The Yuma variety, tested in a 4 acre field, is distinguished by a tendency to develop a stout main stem, with long fructiferous branches. The bolls are pointed and the fibres strong and silky, and on an average about 1 $^1/_8$ in. long. The Somerton variety resembles the Yuma but the bolls are more sharply pointed, the seeds generally smoother, the percentage of cotton smaller, and the plants more bushy.

The strains Nos. 360, 361 and 362 constitute a uniform type very different from the Yuma and the Somerton. The plants are of open habit, with a development of the secondary branches nearly equal to that of the main axis, the bolls are large, short, and abruptly-pointed, and the fibre is of average length, strong and brown in colour.

The principal Egyptian varieties imported into America and sown in Arizona, have given a very inferior product to that obtained from stocks. already acclimatised.

451 **Cotton Cultivation in Tamaulipas, Mexico.** (Baumwollbau in Tamaulipas). —*Deutsches Kolonialblatt*, Berlin, Feb. 15, 1911.

Mexico

Cotton was planted last season for the first time in the neighbourhood of Columbus, in Tamaulipas. The seed came from Georgia. After some small preliminary experiments, the results of which were satisfactory, several hundred hectares were planted with cotton. More than 2 bales of cotton have been obtained per hectare. The boll-weevil has not caused damage. There is a project for further extending this cultivation by importing seed from the United States.

452 **Cotton Cultivation in German East Africa.** — *Deutsches Kolonialblatt*, p. 994, XXI, Jahrg, No. 24. Berlin, Dec. 15, 1910. — *Landwirtschaftliche Maschinen und Geräte*, No. 2. Artern, Jan. 28, 1911.

German colonial Africa. British and French colonies

The aim of the experimental Station of Mpamganya to render the cultivation of cotton more general among the natives, and to instruct them in the necessary knowledge, has been realised. In the districts of Mohorro and Kilwa, the production has been of from 500 to 900 bales of excellent cotton, of about 500 lbs. each. Upwards of 45 000 hectares are now under this crop and the probable future yield is estimated at from 30 000 to 50 000 bales.

A sum has been granted for the present season, and is to be distributed in prizes to those natives who specially distinguish themselves in the cultivation of cotton.

The following provisions are shortly to be made, in accordance with agreements made between the Colonial Government and the Colonial Development Committee, for developing and spreading the industry:

1) The institution of commercial depots for ploughs and agricultural implements at Daresalam;
2) Foundation of cotton-picking establishments;
3) Cumulative purchases of seeds;
4) Distribution of bounties to the best growers;
5) Extension of communications and reduction in the cost of carriage;
6) Utilisation of the secondary products;
7) Control of sales;
8) Exhibitions, etc.

The production of cotton in the German Colonies increased considerably in 1909, the exportation from Togo during the year being 2043 bales of 250 kg., and from German West Africa 2077 bales of 250 kg., or nearly double that of the previous year.

To encourage the development of cotton cultivation in German West Africa a technical Commission has been nominated by the Government, and irrigation projects, already drawn up, are shortly to be carried out. In addition to this, 50 000 hectares of the Mkatta steppes, and 150 000 hectares in the West and South-west districts of Lake Victoria, the upper basin of the Pagani and the lower basin of the Ruon, are to be irrigated for the cultivation of cotton on a large scale.

The extension of the railway line will also favour the increase of the area cultivated in cotton.

The Station at Mpanganya has been especially reserved for the production of cotton seed for plantations.

The Government has opened some depots for German machines for the stripping of cotton in the districts of Morogoro and Muansa. In these districts, as well as in those of Lindi, Kilwa, Mohoro and Neu-Langenburg, bounties have been granted to those natives who have specially distinguished themselves in cotton cultivation, and there has recently been a gratuitous distribution of ploughs and other agricultural implements.

The following table gives a comparison between the cotton production of the German Colonies and that of the French and British Colonies:

	Bales of 250 kgs.	
	1908	1909
British Colonies	16 000	21 400
German »	2 700	4 100
French »	6 700	950

The increase shown in the British Colonies was mainly due to the increased production in East Africa. Cotton is not cultivated in Uganda except by the natives; in Nyasaland, it is cultivated chiefly by Europeans.

The "Piteira" or Mauritius Hemp *(Furcroya gigantea)* a Fibre Plant of Brazil. (A Lavoura). — *Boletin de Sociedade Nacional de Agricultura*, Anno XIV, No. 10, pp. 708-710. Rio de Janeiro, Octobre 1910. **453**

Brazil

The fibre furnished by *Furcroya gigantea* (introduced into Australia, Ceylon and other British Colonies long ago) which has been put on the market under the name of *Mauritius Hemp*, is used to a large extent in rope and carpet industries, etc.

This plant grows wild in the dry waste lands of a large part of Brazil. The writer of this article insists on the necessity of cultivating it on a large scale in Brazil for the manufacture of sacks for packing coffee and cereals.

Jute and other products are at present imported from abroad for this purpose to the value of 12 000 contos yearly in Brazil and 42 000 contos in Argentina (1).

454 Resistance of Abaca Fibres Stripped by Hand and by Machine (2). — *Bulletin Economique de Madagascar*, No. 1. Tananarive, Jan. 1911.

Madagascar

Abaca fibres obtained by machinery are generally considered stronger and more uniform than those obtained by retting or by hand stripping. The Bureau of Agriculture of the Philippines has recently undertaken a series of experiments to ascertain the facts.

Trials were made with 50 cords of 10 staples twisted together, and the number of kilograms necessary for breaking the rope was, on an average, 30 for the fibres obtained by machinery, and 15 for the fibres obtained by hand. Microscopical examination did not reveal any difference between the fibres obtained by the two processes, but it is probable that the continued and regular tension produced by the machine is less prejudicial to the fibre than the irregular action of the workman's tools.

455 Experiments with Sugar Cane Seedlings. — *Annual Report of the Bureau of Sugar Experiment Stations, Queensland*, 1910, pp. 1-8. Brisbane, 1910.

Australia: Queensland

To determine the relative commercial value of ten Hambledon seedlings as croppers and sugar producers, tests were undertaken at the Mackay Central Sugar Experiment Station. The total results do not bear comparison with those obtained at the same Experiment Station from the best of the New Guinea varieties.

The analytical results are given in two tables, the first of which contains the density of juice (Brix) (maximum 21.3, minimum 14.8) the per cent of sucrose (maximum 19.99, minimum 11.29), the per cent of glucose (maximum 2.19, minimum 0.27), and the purity of the juice (maximum 95.1, minimum 76.2) of the crop 1908, the first ratoon crop 1909, the second ratoon crop 1910 and the average of the three years (maximum of sucrose 19.40, minimum 12.29; maximum of juice purity 93.4, minimum 88.2). The second table contains the yield of cane in tons (maximum 155.9, minimum 92.7) and that of sugar (maximum 22.2, minimum 10.9) per acre as total yield of the three crops (1908 to 1910, plant crop, and 1st and 2nd ratoon crops).

In another test the following seedling varieties were experimented:

Queensland 6, *Queensland 30*, *Queensland 102*, *Queensland 116*, *Queensland 121* and *Queensland 176*. These varieties, in common with the majority of seedling canes tried on the Mackay Station, are mostly of delicate habit, and lack vigor, when compared with the older standard canes and the best of the New Guinea varieties. The best of the six is *Queensland 116*; it is a good upright cane, and has a good sugar content. But it possesses the fault of a very early arrowing. If *Queensland 102* improves in its sugar producing power, it should be a fine cane, for the weight is there.

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(1) conto = nearly £80. *Ed.*

(2) Abaca = Manila Hemp, *Musa textilis*. *Ed.*

The *Barbadoes 147* is a promising cane and appears healthier and stronger than other seedlings.

Mauritius Malagache sugar cane has already been grown to some extent in the North of Queensland; it is giving very fair results there.

J. B. Harrison and J. A. Stockdale. **The Sugar Cane Crop on the Experimental Plantations of British Guiana. October-December 1910.** — *The Journal of the Board of Agriculture of British Guiana*, vol. IV, No. 3, pp. 168-173. Demerara, Jan. 1911. **456**

British Guiana

The experiments made in the sugar plantations in British Guiana are interesting especially in the use of fertilisers:

a) Ammonium sulphate has given by far the most satisfactory results as a source of nitrogen, as the following table shows:

Tons of cane per acre.

Ammonium sulphate	Sodium nitrate	Nitrate of lime	Calcium cyanamide	Dried blood	No nitrogen
35	27.4	29.8	27.9	26.2	21.8

The various fertilisers were applied in proportions equivalent to 60 lbs. (1) of nitrogen per acre.

b) The addition of potassium sulphate and of superphosphate of lime to the ammonium sulphate was of little or no advantage.

c) Repeated and abundant manuring with sodium nitrate may render the cultivation of sugar cane in heavy clay soils almost impossible, and years may elapse before the soil resumes its normal fertility.

d) A series of comparative trials with or without superphosphate of lime gave the following mean results:

Tons of cane per acre.

Fields	Without superphosphates	With superphosphates
South	27.6	29.0
North	24.2	25.2

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(1) The English pound = 453 grams [*Ed.*].

The increase due to the use of superphosphates did not repay the necessary outlay.

e) Heavy dressings of lime, applied in 1891, had a notable effect on 14 crops, for 17 years, but their efficacy seems now to be completely exhausted. Thus 49 not limed plots yielded 38 591 lbs. while 49 limed plots produced 38 783 lbs. of sugar cane.

457 H. C. PRINSEN GEERLINGS. **Relation between the Potash and Sugar Contents of the Sugar Cane.** (Archief Suikerind. Nederl. Ind. Java, 1910, 18, pp. 108-117) — *Journal of the Society of Chemical Industry*, p. 41. London, January 16, 1911.

Dutch Indies: Java

It has been shown by Saillard and by Andrlik and Urban that in beets there is a distinct correlation between the sugar content and the percentage of potash and soda, the sugar increasing in inverse proportion to the alkalis. An attempt was made to discover a similar relationship in sugar cane, data for sucrose purity, and potash values of a considerable number of Javan juices being collated. It was found, however, that although a general tendency for a high potash content to concur with low sucrose and purity values is apparently indicated, there is a large proportion of contradictory instances.

The writer concludes that there are other important factors exerting more influence than the potash content on the purity of cane juices.

458 H. BRIEM. **The Selection of Beet Varieties.** (Die Wahl der Zuckerrübensorte).—*Wiener Landwirtschaftliche Zeitung*, 6 J., N. 10, p. 96, Wien, Feb. 4, 1911.

Austria

Two tendencies can safely be followed in the selection of sugar beets:

1) Towards the maximum crop, that is to say, one in which the ratio between the weight of the crop and the results of polarimetric examination, is such, as to give the maximum raw sugar yield per unit of surface; in this case the beets have a good average content in sugar and give a strong crop of roots.

2) Towards the maximum sugar content, that is to say, one in which the greatest importance is given to the amount of sugar as revealed by the polarimeter, without, however, the quantity of the root-crop being neglected.

On the other hand, there is not, according to Mr. Briem, a beet in existence which holds an intermediate position between these two tendencies.

The varieties rich in sugar ripen later than those which produce large crops. They adapt themselvs (like the sugar variety of Wohanka) to damp climates and rich and deep soils, and also to soils which have been improved in rotation with clover, lucerne, beans, or even by the use of strong fertilisers. The varieties which produce heavy crops, (like the Wohanka rich-crop variety) on the contrary, are earlier, and they are better adapted to poorer soils and high arid localities.

The various aptitudes are in a latent state, and are manifested according to different conditions of cultivation: climate, fertility, tillage and manuring of the soil, care of the plants, etc.

459 K. Andrlik and J. Urban. **Influence of Nutrition on the Chemical Composition of Beets and their Variability during the First Year of Vegetation.** (O vlivu vyzivy na variabilitu chemického slozeni repy cukrové v I. roce vegetace). — *Listy Cukrovarnické*, XXIX R., C. 10, pp. 157-167, tab. V, Praze 1. Ledna, 1911.

Austria-Bohemia

The following are the results of a series of 7 experiments made at the Sugar Experiment Station of Prague, in pots of sand, with beets having a high sugar content and descending from the same mother plant:

1) With the same plentiful nutrition containing sodium nitrate, potassium nitrate and superphosphates, there is great variability in the chemical composition of different individuals, both in the roots and in the parts above ground.

The following variations were found in the fresh roots:

	Weight gr.	Percentage of the fresh root Dry matter	Sugar	Ash	Nitrogen	Potash	Soda	Lime	Magnesia	Phosphoric acid
Minimum .	270	21.30	15.7	0.841	0.254	0.240	0.021	0.040	0.061	0.086
Maximum .	720	28.34	20.5	6.601	0.373	0.464	0.096	0.068	0,123	0.135

2) Different quantities of nutritive substances are necessary for the production of 100 parts of dry matter:

	Nitrogen	Potash	Soda	Lime	Magnesia	Phosphoric acid	Sugar % of root
Minimum. . .	1.53	2.21	0.61	0.48	0.41	0.40	15.7
Maximum . .	3.02	3.31	2.56	0.67	0.68	0.66	20.5

3) There are also great differences in the consumption of nutritive substances for the production of 100 parts of sugar:

	Nitrogen	Potash	Soda	Lime	Magnesia	Phosphoric acid	Sugar % of root
Minimum. . .	2.75	3.79	1.09	0.86	0.73	0.87	15.7
Maximum . .	6.64	8.64	6.49	1.80	1.60	1.46	20.5

The great variation in the consumption of soda is remarkable. The maximum being nearly six times the minimum.

460 SCHIFFER. **An Industrial and Commercial Mission in French West Africa. The Oil Palm (*Elaeis guineensis*).** — *Société de Géographie commerciale de Paris*, N. 12, pp. 771-827. Paris, 1919.

French West Africa

The trunk of the oil-palm sometimes grows to a height of from 20 to 25 metres, its average height being 15 metres; its diameter varies between 20 and 35 centimetres, and the cluster of leaves which crowns the stem is composed of from 26 to 30 pinnate leaves. In the centre of this crown is the terminal bud, consisting of young leaves closely folded, the tissue of which is white and tender. This is the "palm-cabbage" which the natives use largely for food.

Incisions are made in the terminal part of the trunk, and often the tree is felled in order to prepare from the pith palm wine, a drink which is very much appreciated by the natives. In certain regions of the Ivory Coast, they cultivate this palm almost entirely for the wine and do not hesitate to sacrifice thousands of trees every year to obtain the palm-must.

When first obtained, the palm-must is the colour of milk, and somewhat turbid, its odour is something like that of grape juice when it begins to ferment. It is slightly sour but contains much sugar and is agreable in taste. At the end of two or three days, the sweet flavour gradually disappears and the wine becomes decidedly acid and alcoholic. Nearly all its sugar content, that is to say, 71 to 72 gr. per litre, is transformed into alcohol, giving a beverage of an alcoholic strength (at 15° C.) of nearly 6 %.

The tree does not begin to produce fruit until towards the fifth year. This fruit is more or less like an elongated and flattened plum. It grows in bunches, the weight of which varies, according to the species and the country, between 5 and 12 or even 15 kg. The pericarp of the fruit is fleshy and fibrous and very rich in fatty matter, and from it the palm oil is extracted. When the pericarp is removed, the palm nut, which is very hard, remains, and this contains the kernel from which palm-nut oil is extracted.

There are numerous varieties of Oil Palms along the West African coast extending sometimes for a distance of 100 or 125 kilometres. They are found in Gambia, Senegal, Guinea, Sierra Leone, the Republic of Liberia, the Ivory Coast, the Gold Coast, Togo, Dahomey, Nigeria-Lagos, Kamerun, French and Belgian Congo, and Angola.

In 1909, the palm trees in West Africa produced more than 100 000 tons of oil and 250 000 tons of palm-kernels, representing a value of 160 to 170 million francs. (£6 400 000 to £6 800 000). The crop was still larger in 1910, and with current prices its value in Europe would be about 350 million francs (£14 000 000). And yet this is only a part, perhaps a third, of the amount that Africa could supply, allowing about another third, which is required by the natives for food.

E. Baillaud. **Utilisation of the Oil Palm according to Messrs. A. Chevalier and E. Poisson.**—*Journal d'Agriculture tropicale*, N. 114, p. 353. Paris, December 1910. **461**

Dahomey. Antilles. India. Malay States.

The Oil Palm, or *Elaeis guineensis*, pratically does not grow wild any longer, and is only reproduced now as a cultivated plant. In large forests where the brushwood has not been cleared away, the palm is stifled and becomes etiolated, rarely giving female spadices. There are thus great extents of forest where it would be sufficient to suppress the intervening vegetation, even to thin the palms, in order that they might begin producing. It is also necessary to cut all the old and dried leaves close to the trunk, loosen the soil at least once a year, and if possible add some fertiliser. In nearly every part of Dahomey, cultivations are made under the *Elaeis.* Chevalier considers the following rotation good: 1. maize; 2 maize; 3. Frenchbeans and pigeon peas (1); 4. native kitchen garden produce; 5. allow land to lie fallow or preserve the preceding plants.

When starting nurseries, it will be best to use nothing but selected seeds. These seeds, however, can only be obtained by artificial fecundation, auto-fecundation being impossible, and naturally crossed fecundation only giving hybrids whose value is not fixed. This explains why the *Elaeis guineensis* produces but little, and is, in fact, almost sterile in the Antilles and the Indian Malay States.

W. J. Gallacher. ***Coffea robusta.***— *La Hacienda.* Vol. VI, N. IV, pp. 121-122, Enero 1911. Buffalo (2). **462**

Congo. Malay States. Java

The above species was discovered in a wild state in the Congo in 1893, by Emile Laurent. It was first of all introduced into the Experimental Station of Huala Lumpur, in the Malay States, and then in 1900 plantations were made in different regions. The *Coffea robusta* is distinguised for its vigour and rapid growth. Compared with the coffee plant of Liberia (*C. liberica*) it has a larger number of berries to each whorl (about 60); the berries are smaller than those of *C. liberica*, but as the skin is finer, the beans are almost of the same size. Two kg. of the berries of *C. robusta* give about the same number of coffee beans as 5 kg. of *C. liberica.*

C. robusta begins to flower at eight months; the flowering season lasts throughout the year, and, unless the wind or other accident supervene, the berries may be gathered once a month. The harvest begins the second year, and attains its maximum at the fourth year, when it becomes constant.

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(1) *Cajanus indicus*, Spreng. Leguminosae. Pigeon pea, Embrevade. Pois d'Angole. See: Sir George Watt. *The Commercial Products of India.* London, 1908. [*Ed.*].

(2) Compare with this Bulletin.

In a plantation in Java, where the plants were growing at a distance of 10 feet (3 m.) from one another in every direction, the following crops were gathered:

	Piculs per acre	Kg. per hectare
2nd year	1	140.61
3rd »	6	896.46
4th »	14	2 091.74
5th »	14	2 091.74

A loamy soil is the best. The plants are started in the nursery, and transplanted when they have 4 or 5 leaves.

The main cultivation work consists in a second ploughing or digging of the soil once a year, beginning in the second or third year. The plant has a tendency to produce primary branches only, but should be induced by pruning to produce secondary branches as well, which are as productive.

The berries should be fermented for 36 hours, and then washed and dried rapidly before being placed on the market. Their quality may be compared to that of the best Santos. *C. robusta* seems to be free from parasites so far, but when it is cultivated together with *C. liberica* it is not entirely immune but is attacked more lightly.

463 Abyssinian Coffees. — *La Quinzaine Coloniale*, Paris. 25 Janv. 1911.

The productive centres of Abyssinia, in order of importance, are Ylon-Babor, Harrar, Checher, Gidamo, Goffa, Uallaga and Koffa; after these come Uchali, Borana, Godiam, Gomma and Jimma.

Abyssinia

All the different varieties of coffee grown in Abyssinia are known in commerce under the names of Abyssinian coffee and "harrari" coffee. The total production of the first is estimated at about 1000 tons. The "harrari" coffee, of which about 3 000 000 kg. are produced, is of superior quality. It is cultivated in Harrar and Checher, mainly by the native Mussulmans, at altitudes varying from 1700 to 2000 metres. At Aden the beans which most nearly resemble Mocha are used to adulterate it.

464 The Future of Tea Cultivation in British India and the Dutch Indies. — *La Quinzaine Coloniale*, Paris, Janv. 25, 1911.

British India. Dutch India

There is a continual decrease in the production of tea in British India, especially in Ceylon. Many planters have destroyed their tea plantations in order to grow *Hevea*, and even where they have not made this radical change, they have planted rubber trees between the tea plants. It is not likely that new tea plantations will be established in Ceylon. In Java very little land seems suited to tea cultivation, but it may be further extended in British India and Sumatra, where seeds have recently been introduced (1).

R. BAND. **Cultivation of Kola in Ashanti.** — *Report of the Agr. Dept. for the Year 1909*, p. 17. Gold Coast, 1910. **465**

Gold Coast: Ascanti

In some villages belonging to the Gold Coast Colony and its dependencies, the planters are beginning to foresee profit from the cultivation of Kola.

Three species of Kola are being grown at the Botanical Station at Aburi: *Cola acuminata*, *C. Johnsonii* and *C. verticillata*. In 1909, 6915 fruits were produced by 93 plants of *C. acuminata*.

A. NORERO. **Cacao Growing in Ecuador.** (Ensayo sobre la Agricoltura del Ecuador: I. El Cacao y su cultivo). — *Prólogo de L. de Hoyos Sainz*, pp. 148 + 1 pl. + index. Madrid, 1910. **466**

Ecuador

This is a complete monograph on the cultivation of the cacao tree, particularly in Ecuador. Besides an introduction, conclusion, and an extensive bibliography, there are twenty descriptive chapters dealing with: the history of cacao, the habitat of the plant, cultivation zone, wild species, climate, soil, preparation of the soil, protection, sowing and plantation, cultivation, manuring, harvest, fermentation of the fruit, preparation of cacao, diseases and enemies of the plant, estimate of cultivation expenses, the world's production, consumption, commerce, and the chemical composition of the fruits.

There are numerous data respecting the cacao tree in Ecuador, where there is a vast zone well adapted to its cultivation, surpassing many European States in extent; it includes the provinces of Esmeraldas, Manabi, Guayas, Rios, Oro, Loja, Pichincha and the Eastern territory. The wild cacao, or *Theobroma bicolor*, Humb. and Bonpl. has been found growing here spontaneously, but it is always well to replace it by new plantations of the common cacao plant, *Theobroma cacao*, Gaertn.

Mr. Norero lays considerable stress on the remarkable percentage of potash in the pericarps of the fruit of the cacao tree, and consequently on the usefulness of these residues as fertilisers; he recommends that they should be heaped up at the foot of the trees, and covered with soil.

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(1) In Ceylon, tea-growing constitutes one of the more important crops. The total area under cultivation in the island is estimated at 2 773 657 acres, of which 553 348 were under tea in 1908, the area under rubber being 131 695 acres. In 1900, the value of tea imported into the United Kingdom, according to the Board of Trade Returns, was 4 096 241 £; in 1906, 3 206 596 £; and 1908, 3 583 974 £.
See: *The Statesman's Year book for 1910*, p. 106. [*Ed.*].

It is equally useful to burn the weeds and other useless plants, the ash of which also contains potash, a substance very necessary to the development of the cacao plant. Cotton cake and lime have also been found efficacious.

The planting of *Anona muricata*, L. is recommended for Ecuador, as it shades the cacao-trees, and also bears edible fruit.

One of the most harmful parasites in Ecuador is the Ascomycete *Botryodiplodia Theobromae*, Pat.

The varieties of cacao produced in Ecuador are: « Arriba », « Balao », « Machala », « Manabi », « Esmeraldas ». The first, which is the best and most esteemed, is produced in the greater quantity; it grows most abundantly along the upper course of the river Guayas. The production of cacao in Ecuador was very uncertain, but during the past 10 or 15 years there has been a progressive increase due to the improvement of cultivation methods. There is still room for further improvement and development.

It should be noted that in 1908 Ecuador ranked next to Brazil in the output of cacao, and produced 36 596 000 kg. (a sixth of the world's production).

467 I. D. KORANTENG. **The Cultivation of Cacao in Ashanti.** — *Report of the Agr. Dept for the Year 1909*, pp. 1-4. Gold Coast, 1910.

Gold Coast: Ashanti

The cultivation of cacao is extending in the Colony of Ashanti, but there are no exact data as to the area covered by the plantations.

The efficient work of the Travelling Agricultural Instructors, whose object is to instruct farmers and assist them in controlling plant diseases, as well as to encourage the adoption of good methods for the fermentation of cacao, has largely contributed to the increase and improvement of the product of late years. The cacao of British West Africa will soon be as greatly esteemed as that of the Antilles. A group of 259 trees, 18 years old, produced 31 225 fruits at Aburi, equivalent to 1270 kg. of prepared cacao, that is to say, about 5 kg. per tree.

468 M. MITLACHER. **Cultivation Experiments with Medicinal Plants in Austria.** (Kulturversuche mit Arzneipflanzen im Jahre 1910). — *Zeitschrift für das Landwirtschaftliche Versuchswesen in Oesterreich*, XIV Jarhg., Heft. 1, pp. 3-38. Wien, Jan. 1911.

Austria

This article deals with some cultivation experiments which have been carried out by the Committee appointed by the Austrian Minister of Agriculture for furthering the cultivation of medicinal plants.

The experiments were begun in the spring of 1910 in the provincial station of Korneuburg, and the first positive results were as follows:

Althaea officinalis (marsh-mallow) yielded 1.4 kg. of the drug per sq. m.

The price obtained was 4 *heller* per kg., so that for 1 are (= 100 sq. m., or 119.6 square yards) the gross proceeds would be about 56 *Kronen*, or 4 s 9 d.

Althaea rosea (hollyhock) entirely escaped the ravages of the ground flea (*Haltica oleracea*), the seeds having been planted close together. It has been observed that these plants, when standing wider apart, are more liable to its attacks. It is remarkable that in a neighbouring bed of white mustard the leaves were totally destroyed. On the supposition that the mustard leaves were more attractive, it is suggested that "snare plants," such as salad, etc., should be sown as a protection.

Artemisia vulgaris (mug-wort). The yield was practically the same with or without manure.

23.2 sq. met. gave 4.9 kg. after drying, that is 21.7 kg. for 1 *are*; 6.51 Kronen or about 5s 6d.

Calendula officinalis (marigold). Yield per *are* 7.3 kg., gross value 14.6 *Kronen*, or about 12s 5d; plants transplanted and manured, gross value for 1 *are* 11.6 *Kronen*, or about 9s 10$^1/_2$d.

The cost of gathering and preparing for sale was found to be 15 times more than the market value.

Cnicus benedictus (holy-thistle). Yield of stems:

	Weight	Value		
1 *are* manured	113.4 kg.	56.7 *Kr.*,	or about	£2 8s 2d
1 *are* non-manured	82.2 »	41.1 »	»	£1 14s 11d
1 *are* transplanted	26.5 »	13.2 »	»	£0 11s 9$^1/_2$d

The leaf crop cost 3 *Kr.*, or about 2s 6$^1/_2$d, to gather, the value realised being only 2.10 *Kr.*, or about 1s 9$^1/_2$d, while the stem crop only cost 1.80 *Kr.* (about 1s 6d), and the value realised was 9 *Kr.* (about 7s 7$^1/_2$d).

Conium maculatum (hemlock). Yield for

1 *are* manured	15.8 kg.	22.12 *Kr.*,	or about	£0 18s 10d
1 *are* non-manured	13.6 »	19.60 »	»	£0 16s 7$^1/_2$d

Datura Stramonium (thorn-apple). Yield for:

1 *are* manured	33.3 kg.	16.60 *Kr.*,	or about	£0 14s 1d
1 *are* non-manured	23.2 »	11.60 »	»	£0 9s 10$^1/_2$d

Hyssopus officinalis (hyssop). Yield for:

1 *are* manured	27 kg.	18.90 *Kr.*,	or about	£0 16s 0$^1/_2$d
1 *are* non-manured	24.2 »	16.90 »	»	£0 14s 4d

Mentha crispa (curled-mint). Yield for:

1 *are* manured	13.1 kg.	9.17 *Kr.*,	or about	£0 7s 10d
1 *are* non-manured	10.4 »	4.28 »	»	£0 3s 7d

The leaves alone, marked as "Extra quality" only fetched half the cost of separating them from the stems.

Mentha piperita (peppermint). Yield including stems for:

1 *are* manured	16.6 kg.	19.92 *Kr.*, or about	£0 16s 11d
1 *are* non-manured	9.7 »	11.64 ›	£0 9s 11d

Ruta graveolens (rue). Yield for:

1 *are* manured	10 kg.	9 *Kr.*, or about	£0 7s $7^{1}/_{2}$d
1 *are* non-manured	6.5 »	5.95 » »	£0 5s $0^{1}/_{2}$d

Salvia officinalis (garden sage). Yield almost exclusively of leaves for:

1 *are* manured	15.8 kg.	9.48 *Kr.*, or about	£0 8s 0d
1 *are* non-manured	12.5 »	7.5 » »	£0 6s 5d

Sinapis alba (white mustard). Yield for:

1 *are* manured	18.61 kg.	7.41 *Kr.*, or about	£0 6s 4d
1 *are* non-manured	14.26 »	5.7 » »	£0 4s $10^{1}/_{2}$d

The trials were made with 45 medicinal plants altogether. As a rule, given the inferior quality and high price of the seed, it is better to use home grown seed.

469 F. RABAK. **The Production of Volatile Oils and Perfumery Plants in the United States.** — *U. S. Dept. of Agr. Bur. of Plant Industry*, Bull. No 195, 48 pages. Washington, Dec. 9, 1910.

United States

There are at present but few aromatic plants cultivated in the United States, but the numerous wild varieties, as well as the favourable conditions of climate and soil, which encourage the introduction of new species, justify confidence in the future of this industry.

The extraction of the volatile oil of *Mentha piperita* (peppermint) and *M. spicata* (spearmint) dates from 1816; the chief centres of production are at present in the States of New York and Michigan.

The following essence-plants are also cultivated:

Artemisia Absinthium (Wormwood) in Wisconsin, Michigan, the State of New York and other North-Central States. The distillation from fresh flowering herbs yields from one-third to one-half per cent.

Tanacetum vulgare (Tansy) which is cultivated in a small way in the Eastern part of the United States, yields from one-tenth to one-fifth per cent of an oil chiefly used in medicine.

Chenopodium ambrosioides, L. var. *anthelminticum* (American Wormseed), cultivated in Maryland. The seeds and their oil possess valuable vermifuge properties.

The Southern and Gulf States, from Virginia to Florida, produce a large quantity of oil of turpentine. This constitutes one of the two distillation products of the oleoresins of the *Pinus palustris*, Miller, *P. Taeda*, L. and *P. echinata*, Miller, the other product being the colophony of commerce.

Results obtained at the Experimental Station of Arlington, near Washington, are favourable to the cultivation of these essence-producing plants on a large scale, as well as to that of numerous wild species which can probably be greatly improved.

Among wild aromatic plants from which volatile oils are extracted are:

Sassafras officinalis, in Florida, Pennsylvania, Maryland, Virginia, and as far north as the States of New England and New York. The root, bark and wood are used, and the yield is from 1 to 8 %;

Gaultheria procumbens (Wintergreen) and *Betula lenta* (Sweet Birch) are found growing from New England to Georgia, Florida and Alabama. The oil in these plants is formed by reaction and does not preexist in the tissues. The glucosid gaultherin is the constituent to which the formation of this oil is due, and since the reaction between this glucosid and the plant ferment is the same in both plants, the resulting oil, or methyl salicylate, is necessarily similar. Of the *Betula* the part used is the bark, and the yield is from three-tenths to three fifths per cent; while of the *Gaultheria* the leaves and twigs are taken, and they yield from 1/2 to 1 %.

Two tons of leaves and twigs of *Eucalyptus Globulus* yield 3 to 4 gallons of an oil which contains 70 to 90 % of eucalyptol. This industry is almost entirely confined to California.

The oils extracted from the *Monarda fistulosa* (Wild Bergamot) and the *M. punctata* (Horsemint) are composed respectively of the liquid phenol carvacrol, and the crystalline phenol thymol. The plant is distilled in full flower, and the yield averages from 3/10 to 1 %, or more.

Other plants might be cultivated with profit, and their products largely used in perfumery. These are: *Erigeron canadensis*, *Hedeoma pulegoides*, *Pelargonium odoratissimum*, *Lavandula vera*, etc.

The extraction of the essential oil fron orange or lemon peel might be developed in California, as it is already in Sicily and elsewhere in Italy.

The value of the volatile and distilled oils, imported into the United States for the year ending June 30, 1908 is roughly estimated at 3 million dollars, a figure quite high enough to make an industry prosperous.

B. Pfyl and W. Schweitz. **Contribution to the Study of the Constituents of Saffron and a Method for Determining its Purity.** — (*Zeitschr. für Untersuchung der Nahr-und Genussmittel*, XVI, pp. 337-347); *Moniteur Scientifique*, Liv. 830, pp. 116-120 and pp. 120-122. Paris, Fév. 1911. **470**

Germany

These experiments should serve as the basis for a method of detecting a common fraud in the saffron industry, which consists in separating the styles from the stigmata, and in selling the former, in themselves valueless, after mixing them with a small proportion of the stigmata.

In the absolute alcohol extract (after treatment with petroleum ether and chloroform) a free sugar, fructose, was found. In addition to this there is a glucoside giving rise to fructose and an ethereal oil with the odour of saffron.

A close study of the petroleum ether and chloroform extracts has led to the discovery of three crystalline substances. That found in the chloroform extract, is analogous with Kayser's picrocrocine, in that it can be decomposed into an ethereal oil with saffron odour, and a sugar which is laevogyre and is not mixed with glucose. The decomposition of the crocine gives rise to glucose, identified as naphtylhydrazone.

To detect the above mentioned fraud, it is sufficient to remember that the residue of the chloroform extract of saffron stamens, absolutely desiccated and treated with petroleum ether, contains a glucoside, which by decomposition gives rise to fructose; this sugar strongly reduces Fehling's solution. In the case of genuine saffron, the decomposition product of the extract prepared in the manner described contains no fructose and therefore only imperceptibly reduces Fehling's solution.

Carthamus tinctorius, *Calendula officinalis* and other substances used for the fraud, under similar treatment, show no reduction of Fehling's solution. With curcuma and Sandal-wood special care is needful. By following the method described in this article, and by taking Gatinais saffron as the standard, the proportion of pure saffron in all the adulterated articles may be found.

This investigation is not complete, and merits further attention.

471 H. G. AGUGHIARO. **Tomatoes in Sicily.** *Coltivazione razionale del pomodoro*, in-8, pp. 1-46. Catania, 1911.

Italy: Sicily

The cultivation of tomatoes (*Solanum Lycopersicum*, L.) is extending rapidly in Southern Italy, where the climate is particularly suited to their early production. They are also grown on a large scale in Sicily, especially in the provinces of Palermo, Syracuse, Catania and Trapani, although to a decreasing extent in the last three. After observing that tomatoes might profitably replace beans, where the latter are attacked by broomrape, (*Orobanche*) Mr. Agughiaro describes tomato cultivation. The sowing of the seeds, the climate and soil, manuring, preliminary work, transplantation, place in rotation, attention during growth, crops, utilisation and price of tomatoes, determination of the residual fertility left by the crop, and the cultivation expenses, are successively considered in special relation to the conditions prevailing in Sicily.

Mexican Tomatoes for the United States. — *The Canner and Dried Fruits Packer*, vol. XXXI, No. 25, p. 40. Chicago, Dec. 29, 1910. 472

Mexico. United States

Shipments of ripe tomatoes from the Gulf Coast Region of Mexico to markets in the United States are now being made in large quantities. The crop this year will be much larger than that of last season. From San Dieguito last year only 5425 crates were shipped, as against 52 600 that are assured this year.

From Forlon last year only 25 600 crates were shipped and this year the shipments will reach 44 000 crates.

The "Narras," A Food in German South West Africa. — *La Quinzaine Coloniale.* Paris, Jan. 25, 1911. 473

Sout West German Africa

The tribes of Walfisch Bay consume the fruit of a cucurbitacea, *Acanthosycios horrida*, a leafless plant which grows on the sand-dunes of the German coast. The green stems which are furnished with runners are much ramified and covered with sharp thorns which grow in pairs, and afford an efficient protection against the attacks of animals. The root is slender but very long (sometimes attaining a length of 15 metres) it penetrates to the bottom of the dune, while the aerial portions of the plant always rise above the sand.

The fruit sometimes weighs 1.5 kg., and when ripe is easily divided into 10 segments, each containing numerous seeds. The flesh of the unripe fruit is very bitter, but when ripe it is rich in sugar and is very nourishing. It constitutes the chief food of the Hottentots of the German Colony (1).

CH. STAIB. **Smudging Strawberries as a Protection from Frost.** (*Paper read at the Strawberry Congress held at Neosho, Mo.*, Nov. 15, 1910).— *Colman's Rural World.* St. Louis, Mo., December 21, 1910. 474

United States

To protect the strawberry beds from frost, 300 Troutman Orchard Heaters were placed in the strawberry fields, 80 to 100 to the acre (4046 sq. metres), 700 gallons (2646 litres) of fuel oil were bought in barrels at the rate of six and one-half cents (33 centimes) per gallon (3.78 litres), (crude oil for smudging can be secured in tanks of 7000 to 8000 gallons at 2 $^1/_2$ cents per gallon).

These experiments showed that 125 to 150 heaters to the acre are needed to fully protect the bloom and berries from a frost of — 4.5° C.

The cost of the smudging was as follows:

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(1) On *Acanthosycios horrida*, or Naras, see also: A. F. W. SCHIMPER, *Pflanzen-Geographie auf Physiologischer Grundlage Zweite Aufl.*, Jena, 1908, p. 663. The roots, may be often as thick as a mans arm.

300 heaters	$ 60.00 (309.00 fr.)
700 gallons of oil	$ 45.50 (234.25 fr.)
Total . . .	$ 105.50 (543.25 fr.)

For 3^1_2 acres (1.45 hectares).

475 F. V. Coville. **Blueberry Culture.** — *U. S. Dept. of Agriculture, Bur. of Plant Industry*, No. 193, pp. 1-100, figs. 31, tav. XVIII, Washington, 1910.

United States

Mr. Coville states that there is a demand for the fruit of the *Vaccinium corymbosum* (American variety of Blueberry) and he thinks that good results might be obtained from the cultivation of the plant. The experiments made so far, however, have given but negative results, because conditions of soil necessary for the *Vaccinium corymbosum* were not sufficiently taken into consideration; the plant requires radically different conditions from those which are suitable for cultivated plants in general. The numerous experiments made by the writer have shown that two methods may be employed with success in this culture.

The first method consists in planting in trenches or holes containing at least a cubic metre of well macerated peat and afterwards covering with foliage or sand. The surrounding soil should be porous and also well drained, so that the roots are in a constantly damp medium during vegetation.

The second method is to sow in peat bog that has been previously drained, covering the seed with clods of turf and sand.

476 O. L. **Pineapples as a Temporary Crop and Cover for the Soil in Hevea Plantations.** — *Journal d'Agriculture tropicale*, No. 114, p. 382. Paris, Déc. 1910.

The owners of *Hevea* plantations frequently have recourse to interplantings which give a produce enabling them to wait for the *Hevea* to yield. The Pineapple would grow well near the *Hevea* during the first years, having in fact all the qualifications for a good cover cultivation:

1) it does not delay the growth of the *Hevea;*

2) it fructifies rapidly;

3) it has no woody roots that easily become the seat of diseases likely to injure the rubber;

4) its removal offers no difficulty;

5) it does not contract diseases infective to *Hevea.*

An acre (4046 sq. metres) will take 2000 Pineapple plants, and the crops may be gathered from the second year. At the end of the fourth year the Pineapple plants are uprooted. Dr. Lim Boon Keng has estimated their production during this period at 650 frs. He considers the Pineapple would form an excellent cover plantation, in no way exhausting the soil if this be sufficiently manured.

L. FONDARD and F. GAUTHIE. **Fertilisers for Rose trees.** — *La Petite Revue Agricole et Horticole*, N. 384, p. 10. Antibes, Jan. 1911. 47

France

The writers' researches have shown that rose-trees take out of the soil the following quantities of nutritive substances per are:

Nitrogen.	0.840 kg.
Phosphoric acid . . .	0.290 »
Potash . . . . , . .	0.490 »

The following manure is recommended:

Farm-yard manure. . .	300 kg.
Bone superphosphate . .	4 »
Thomas slag	8 »
Sulphate of potassium .	2 »

The fertiliser should be dug into the ground during the spring.

In the course of vegetation and according to need, a little nitrate of sodium should be distributed among the plants. In autumn it is advisable to use dried blood or sesame cakes, 12 to 15 kg. per are of the first, or 7 to 8 kg. of the second. When these manures are employed, 8 kg. of bone superphosphates and 3 kg. of sulphate of potassium should be added.

The Fresh Flower Trade in Austria. — *Feuille d'Information du Ministère de l'Agriculture.* Paris, Jan, 17, 1911. 478

Austria.
Italy.
Germany.
Belgium

The trade in cut flowers is at present very active in Austria, especially in Vienna. The flowers come from France, Germany, and Belgium, but chiefly from Italy, Italian flowers being very cheap. Roses are furnished mainly by Italy, France and Germany, lilac by France and Germany, pinks, violets and daffodils by Italy, France and Germany. The cultivation of flowers has reached a high point in Germany, in the Taunus and in Thuringia. Belgium has made a speciality of orchids.

The French exportation of flowers to Austria might be greatly increased, but the French do not make a speciality of the cultivation of flowers, nor do they attach sufficient importance to packing.

R. GOETHE. **Unfavourable Influence of Grass on the Growth of Fruit Trees.** (Etwas vom Einfluss des Rasens und eines ungünstigen Untergrundes auf das Wachstum von Obstbaümen). — *Geisenheimer Mitteilungen über Obst-und Gartenbau,* XXVI Jahrg. No 1, 3 figs., pp. 2-5. . Wiesbaden, Jan. 1911. 479

Germany

Near Darmstadt, Mr. Goethe observed several plum trees planted in soil which was very sandy on the surface, that were in a bad state of vegetation. Two of them which were in a meadow were uprooted and their roots were found to be very little developed and superficial, some of them were brown in colour, and when cut presented a reddish brown section.

A tree in a neighbouring field, of the same species and nearly of the same age, was on the contrary in an excellent state of vegetation, although the soil was of the same nature. It had, however, been tilled, instead of being left in grass.

Mr. Goethe thinks that the marked inferiority of the first trees was due to the soil's being covered with grass, and he suggests that the soil round fruit trees should be tilled and grass never allowed to grow.

480 A. Desmoulins and V. Villars. **Direct Hybrid Producers in the Vineyards of the Rhône, Valley, in 1910.** – *Progrès agricole et viticole*, Nos. 3, 4, 5. Montpellier, Janv. 15, 22, 29, 1911.

France

Messrs. Desmoulins and Villars have closely studied during 11 years the characters, and advantages of the principal direct hybrid producers in their vineyards in the Rhône valley (France).

Their observations are drawn up in three tables.

In the first, the colour of the grapes is given, the period of maturity, the resistance of the leaves and bunches to mildew, the vigour, the maturity of the branches and an estimate of the bearing qualities. The summary concludes with some special observations.

In the second table, the grape-bunches of the principal hybrids are studied, and data given of their average weight, the proximity of the berries ("compactness" of the cluster) the size of the grapes and their general health conditions at the time of maturity.

In the third table there is a concise analysis of the must of the most profitable varieties, giving the total acid and sugar content. In the two first tables, all the preceding characteristics are indicated by figures between 0 and 5; 0 denoting absence of a characteristic and 5 its maximum degree.

In conclusion it is stated that there are numerous hybrid vines which are really profitable as direct producers. The question only concerns the common wines suited for ordinary consumption, fine wines are not to be expected from hybrids. In valleys which are more or less cold and subject to spring frosts, in habitually damp situations where diseases often are prevalent, and in regions where the cultivation of the vine is only accessory, the direct hybrid producers render much service and, on account of their great resistance to cryptogamic diseases, always ensure a satisfactory vintage.

JOHN BARRETT and FRANCISCO J. YANES **Viticulture in Chile**. *A General Sketch compiled by the International Bureau of the American Republics.* Washington, 1910, pp. 128-133. **481**

The cultivation of the vine and the manufacture of wine are one of the most important branches of agriculture in Chile, considerable quantities of wine being exported to Bolivia and Peru.

Chile

The Government has established various schools for the study of vine culture and wine making and has introduced new methods and machinery.

There is now an area of 60 000 hectares under vine cultivation in Chile, yielding over 2 000 000 hectolitres of wine. Viticulture in Chile dates back about 30 years, although the vine was introduced by the Spaniards in the 16th century. The grape of the Southern vine-zone of Chile is generally small, and grows on the hill-sides, while the grape of the Central zone is larger in size and thrives equally well in the plains and on the hills. The grape region is from Coquimbo to Angol, at a maximum altitude of 700 metres above sea level. The vine begins to yield in the dry or *rulo* lands, from six to eight years after planting, attaining its maximum production at the twelfth year, while in the irrigated or *regatio* lands production begins from the third to the fourth year, reaching its maximum from the sixth to the eighth year. Fifty years is the average life of a vineyard in Chile, the yearly vegetation lasting from August to May.

The varieties most common in Chile are the following: Golden Chasselas, Gamet, Pinots (two varieties), Muscat, Sauvignon and Semillon (French stock); Palomino and Muscat of Alexandria from Spain; and Riesling from Germany among the white varieties. Among black grapes are the following: Aramon, Cabernet, Cabernet-Sauvignon, Gamet d'Orleans and Petit or Black Gamet, Grappe, Cote Rouge or Malbec, Mansenc, Merlot, Black Muscat, Petit Bourchet, Black and Grey Pinot and Romano or Caesar grapes.

The following is the average wine-yield per plant in the Chilean vineyards:

White Loca . . .	1.67	litres	White Semillon .	0.87	litres
Cabernet	1.30	»	Native Grape . .	0.83	»
Muscatel	1.30	»	Black Pinot . . .	0.78	»
Merlot	1.28	»	Black Gamet . .	0.72	»
Verdot	1.25	»	White Pinot . . .	0.66	»
Malbeck	1.20	»	White Sauvignon .	0.64	»
Romano	1.09	»	Riesling	0.58	»

At the School of Viticulture of Cauquenes the quantity of wine-must obtained from 100 kgs. of grapes was as follows:

White Loca . .	58.40 litres	Black Muscatel .	50 — litres
White Semillon .	56 — »	Molinero . . .	49.30 »
Verdot	55.40 »	Native variety .	47.50 »
Malbec	54.50 »	Gamet	46.70 »
White Muscatel .	52 — »	Pinot	46.70 »
Cabernet . . .	51.90 »	Romano. . . .	41.10 »

The Southern varieties contain more juice than the Northern.

482 ZACHAREWICZ. **Manuring Olive Trees.** — *Bull., Régence de Tunis*, n. 55. Tunis, 1910.

France

First experiment: The demonstration field (in the South of France), where 200 olive trees were growing, was in a very bad state when it was bought in 1894. In 1895 the trees were pruned and manured with 1000 kg. of farm yard manure and 200 kg. of superphosphate of lime. The next year, instead of farm yard manure, the following fertilisers were given:

Sulphate of potassium . . . 600 gr. per tree
Superphosphate of lime . . 2 kg. » »

The returns given below demonstrate the efficacy of the method, but it must be observed that in the years when the trees were pruned they were treated with farm yard manure, and in the other years with chemical fertilisers:

In 1896 the return was . .	426 fr.	In 1904 the return was .	1 371 fr.
» 1898 »	584 »	» 1906 »	1 224 »
» 1900 »	1 344 »	» 1908 »	1 565 »
» 1902 »	1 091 »		

The cultivation expenses for the two years were 181.70 frs.

Second experiment: The second demonstration field, at Vacqueyras, had 48 olive trees, and the cultivation improvements began in 1902. The soil being fairly rich in nitrogen, potash and phosphoric acid, the following fertilisers were applied:

Sesame-oil cake	kg. per tree	2.0
Chloride of potassium.	» » »	0.3
Superphosphate of lime	» » »	1.5

The trees were pruned every four years, and slightly every two years to thin the branches.

The returns were as follows:

1902	165.75 fr.	1906	1 005.00 fr.
1903	384.40 »	1907 (pruning year)	430.00 »
1904	903.00 »	1908	2 080.00 »
1905	850.95 »		

There has been no trace of disease on the trees since 1905. The manuring was always done at the same periods.

483 J. B. HARRISON and J. A. STOCKDALE. **Wind-breaks and Cover-crops in the Cultivation of Limes.** — *The Journal of the Board of Agr. of British Guiana*, Vol. IV, No. 2, pp. 86-94. Georgetown, 1910.

The zone of permeable and light soils which occupies a vast extent in the interior of British Guyana is suitable for the cultivation of the lime.

British Guiana

Messrs. Harrison and Stockdale give some information concerning the cultivation of this fruit, and insist on the necessity of having windbreaks. They recommend the use of the following trees for this purpose: *Erythrina glauca*, *Inga ingoides*, *Calophyllum Calaba*, *Pimenta officinalis*, *P. acris*, and *Eugenia malaccensis*.

They also counsel the cultivation of low-growing leguminous plants (*Desmodium*, *Canavallia ensiformis*, and *Tephrosia purpurea*) for cover crops. The average yield of limes per acre being 162 barrels, this industry should prove a very remunerative one for small farmers whose land is of a loose friable character.

484 TRABUT. **Early Oranges of the "Navel„ Group in Algeria.** — *Bulletin des Séances de la Société Nationale d'Agriculture de France*, No. 10, pp. 887-889, Année 1910. Paris, Dec. 1910.

Algeria

An important collection of *Citrus* was introduced into the Botanical Gardens at Algiers some 12 years ago by the Botanical Service, with the object of finding varieties that might be advantageously cultivated in the North of Africa.

After 12 years' observation, the introduction of the Navel Orange into Algeria may be regarded as likely to be of considerable advantage to cultivators of citrus fruits (1). The following varieties have been found to be vigorous and fertile.

Golden Buckeye, very early, skin very fine, pale, with darker bands, flesh very sweet;

Thomson Navel, flesh firm, skin well coloured, very fine fruit;

Navelencia, very similar to the Thomson, but with a finer flesh;

Florida Surprise, very fine fruit, very good;

Australian Navel, not so early;

Navel Nugget, large fruit, deep coloured flesh.

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(1) The *Navel* oranges, the best known of which is the *Washington Navel* or *Bahia*, are varieties which originally were obtained by chance from seed.

The *Washington Navel* was imported from Brazil by M. W. Saunders, of the Department of Agriculture of the United States. (See L. H. BAILEY, *Cyclopedia of American Horticulture*, New York, 1907, vol. III, p. 112). [*Ed.*]

485 **Production of Figs in Anatolia.** — *Bulletin de l'Office du Gouvernement de l'Algerie.* Paris, Jan. 15, 1911.

Turkey in Asia: Anatolia

The climatic conditions in 1911 were extremely favourable to the growth of figs in Anatolia, with the result that the crop was estimated at 45 000 quintals more than in 1909. This increase was as notable in the case of the expensive Eleme table figs, as in that of the Hordas, a fig of much less value, which is principally used in Germany and Austria for the manufacture of coffee substitutes and in distilleries. The season opened with very high prices, in spite of the large crop.

Sylviculture.

486 J. Stirling-Maxwell. **Proposals for Afforestation in Scotland.** — *Trans. of the Roy. Scottish Arboricultural Society*, Vol. XXIV, P. I., pp. 1-6. Edinburgh, Jan. 1910.

Great Britain: Scotland

In his capacity of President of the Royal Scottish Arboricultural Society, Mr. Stirling-Maxwell has addressed a letter to the members of the Development Grant Commission, in which he draws attention to the preliminary measures to be taken for the development of arboriculture in Scotland. The measures are as follows:

1) A survey to determine the area which it is economically desirable to afforest;

2) A Demonstration Forest, with a Forest School;

3) Forest Gardens for the three teaching centres, Edinburgh, Glasgow and Aberdeen.

The letter insists on the necessity for determining the area which is to be economically afforested, because no precise information being at present available, it is difficult to draw up estimates and take important measures. The Society is at present engaged upon the survey of an area in Invernesshire which will serve as a model for future surveys of the same kind.

It is a difficult undertaking, for it includes not merely the ascertaining of the area which is capable of growing good timber, but the demonstration, by means of maps etc., of the manner in which a large forest can be made, its cultivation, exploitation, and attendant industries. Its consequences upon existing interests and local rates must be traced, and its effect upon employment in the district.

Forest Products of Canada in 1909. — *Bulletin No 11, Forestry Branch, Dept. of the Interior*, p. 30. Ottawa, Canada. 487

Canada

This is a Report on the production in Canada of lumber, square timber, lath and shingles in 1909. It is a compilation by Mr. B. R. Macmillan B. S. A. M. F. from reports made directly to the Forestry Branch by 2085 operating sawmills.

The total increase in production has risen to 13.9 % in the lumber output, or 466 760 000 board feet more than the cutting of 1908

It is shown, that the province of Ontario produces 2/5 of the Canadian lumber; that the spruce is the most widely spread species; that the production of hard wood is only 5.7 % of the general total, and that the production of square timber for export has declined one twelfth of what it was. The total output of lumber was 3 814 942 thousand board feet, representing a total value of 62 819 477 dollars (323 520 306.55 fr.). High as these figures may appear, they represent a little less than 1/9 of the lumber cut in the United States in 1908. The quantity produced by the province of Ontario was 2/5 of the whole amount, an increase of 17.3 %.

The following are the species of wood cut into lumber, arranged in order of production: Spruce, White Pine, Douglas Fir, Hemlock Spruce, Cedar, Red Pine, Balsam, Tamarack, Birch, Maple, Bass-wood, Elm, Jack Pine, Yellow Pine, Ash, Beech, Poplar, Oak, Hickory and Walnut.

C. Wilgress Anderson. **Forests in British Guiana. Forestry Officer's Reports. Christianburg Lands, British Guiana.** — *The Journal of the Board of Agriculture of British Guiana*, Vol. IV, No. 3, pp. 153-156. Demerara, January 1911. 488

British Guiana

The data concerning the nature and composition of the forests in the district of Christianburg (British Guiana) in the January Report of the "Forestry Officer," are of value also for the entire wooded zone which extends along the Demerara River.

The following principal groups are classified according to the nature of the soil:

1) *Forests growing on the sandy hills;*

Number of trees per acre which are more than 18 inches (45 cm.) in girth 162.5.

Species botanically identified: *Eperua falcata*, Aub., *E. Jenmani*, Oliv., *Tapiria*, sp., *Lecythis*, sp., *Pentaclethra filamentosa*, Bth., *Nectandra*, sp.

2) *Forests growing on flat clay land.*

Number of trees per acre measuring more than 20 inches (m. 0.50) in girth: 129.3.

Species: *Hieronyma laxiflora*, Mull., *Ocotea*, sp., *Inga ingoides*, Eul., *Diplotropis brachypetala*, Bth., *Pithecolobium trapezifolium*, Bth., *Pterocarpus Draco*, Linn., *Sterculia*, sp. and *Licania* sp. etc.

There are also about 32 specimens of *Euterpe edulis* per acre.

3) *Forests growing on slightly elevated clay land containing laterite.*

Number of trees per acre measuring more than 22 inches (55 cm.) in girth: 202.5.

Botanically identified species: *Pithecolobium trapezifolium*, Bth., *Goupia glabra*, Bubl., *Licania mollis*, Benth., and *Dipteryx odorata*, Willd.

489 J. Barret and F. J. Yanes. **Forest Products of Chile.**—*A General Sketch Compiled by the International Bureau of American Republics*, pp. 137-138. Washington, 1909.

Chile

The area covered by forests in Chile is estimated at about 200 000 square kilometres, about 75 000 sq. miles, almost 27 % of the total area of the country. In the Provinces of Valdivia, Bio-Bio, Llanquihué, Chiloé there is abundant timber for building purposes and cabinet woods and also a number of trees, which are valuable on account of the tannin of their bark, such as the quillay (*Quillaja saponaria*), the lingue (*Persea Lingue*) and the ulmo. In 1907 Chile exported 1 314 500 kilos (2 893 000 lb.) of quillay bark and 748 600 kg. (1 647 200 lb.) of lingue. Most of the quillay is exported to Great Britain and Germany while Perù is the largest purchaser of lingue.

Other trees of special interest are the Chilean Palm (*Jubaea spectabilis*) from which a syrup is obtained called *miel del pais*, and the *Balsamocarpum*, the seeds of which contain *algarobilla*, which has large percentage of tannin. *Algarobilla* is also obtained from a number of shrubs; 136 000 kg.(300 000 lb.) were exported during 1907.

Among the many varieties of medicinal herbs that thrive in Chile, the most important are: The *Boldo* (*Peumus boldus*); the Canchalagua (*Chironia chilensis*); the Paico, Piche, Pircum, Palqui, Matico, etc., all of these are indigenous and no attempt has as yet been made to cultivate any of them. During 1907, 182 550 kgs. (401 500 lb.) of medicinal herbs of all kinds were exported from Chile, and shipped chiefly to Germany.

There are over one hundred different classes of forest trees in Chile, some of the principal ones being the white acacia (*Robinia pseudoacacia*), the poplar, the *Prosopis* carob tree, the *Araucaria*, the cypress, elm, oak, ash, hickory, walnut, cedar, and several species of pines. The *Eucalyptus* has been successfully planted.

Chile exported 233 748 Chilean pesos' (£46 749) worth of lumber during the year 1907, according to the last statistics available.

G. E. Lyon. **New Jersey Forests and Forestry.** — *Forestry Quarterly*, Vol. VII, No. 4, pp. 450-461. Cambridge, (Bost.) Mass. 1910. **490**

United States: New Jersey

The question of forests in relation to water supply is of extreme importance in New Jersey. Much study has consequently been given to the effect of forests on the run-off of streams. The following conclusions have been reached:

1) Forests have no important effect on the total evaporation from the stream catchment, or area which supplies water to the stream;

2) Forested country feed springs better, since the humus and soil absorb the rainfall more readily; consequently, forest streams are more equable and less liable to long periods of extreme low water;

3) Floods are less frequent in forested streams, due partly to the causes mentioned above and partly to the slow melting of snow and ice. Nevertheless, forest streams sometimes have high freshets;

4) Forest streams do not carry much mud and silt in suspension. Good conditions for water supply are found when about three-fourths of the catchment is covered with forest, while the area along the stream is in grass.

N. Scholz von Aschersleben. **Natural and Artificial Regeneration of Deciduous Trees in the Forest Region of the Steppes.** (Estestvennoe i iskustvennoe Vosobnovlenie Dubrav Lieso-steenoi polosci. Sapiski Novo-Aleksandriiskago Instituta tchelskago Khosiaistva i Lieso-vodstva). — *Memoirs of the Agronomic and Forestry Institute of Novo-Alexandria*, Vol. XXI, pp. 15-44. St, Petersburg 1910. **491**

Russia

This paper treats of a system of regenerating forests by a thick growth of deciduous trees, in the exhausted black lands and in the clay-silicious woodlands on hillsides or on the plains.

Among the several rules regarding forest regeneration stress is laid on the good effects obtained by sowing acorns collected from distant localities, rather than relying solely on the acorns produced by the forest that is being regenerated.

In order to ensure the germination of the seeds and the normal growth of the trees, all young growths should be sheltered by a protective plantation.

492 MATTHES. **Development of the Roots of Norway Spruce: Effets of Manuring and other Treatment** (1). (Mitteilungen uber Bau und Leben der Fichtenwurzeln und Untersuchung uber die Beeinflussung des Wurzelwachstums durch wirtschaftliche Einwirkungen). — *Allgemeine Forst- und Jagd-Zeitung*, LXXXVII J., No. 2, pp. 1-6. Frankfurt am Main, Jan. 1911.

Germany

An important question connected with reafforestation, especially on uncultivated lands, is that of the rotting of the trunk and roots of the Norway spruce and the Pine. The roots of the Norway spruce grow near the surface, so that any treatment which may cause the roots to develop deeper down, thus increasing the resistance of the plant to atmospheric influences and to rot, are of great advantage.

Norway spruces 4 year old were planted on heath land; after 12 years the primary roots of trees manured with from 10 to 12 gr. of superphosphate of ammonia had grown to a length of from 0.55 to 2 metres and a diameter of 9 to 22 mm., while the roots of the unmanured trees were stunted and ailing, the primary ones being no longer than 0.2 to 1 metre and their diameter from 4 to 6 mm. The advantage of using chemical fertilisers is therefore evident. The cost, however, is excessive; 150 fr. per hectare.

An intermingled growth of Norway Spruce and Alders has given remarkable results. A spruce 15 years old had a primary radical development of from 2.5 to 3 m. in length and 55 mm. in diameter; some of the roots had come into contact with the alders and the superficial roots showed a tendency to penetrate deeper. This fact has caused an experiment to be made on a large scale, alders being planted in the clearings.

In cultivated soils there is an excessive competition among roots and consequently an excessive development of the roots to the detriment of the growth in height.

Lupins cultivated in intervening spaces do great service in remedying this state of things, but the cost here is also too great: 150 fr. per hectare.

A modification of the experiment was made by sowing lupins without ploughing either the cultivated soil or the heath land, and the cost dropped to 25 fr. per hectare. Lupins do not thrive in glades, and it is recommended that the layer of humus be burnt.

Some spruce associated with acacias showed a remarkable development; their roots came in contact with those of the acacia, but they remained shorter than when associated with beech

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(1) The Norway Spruce is the *Abies excelsa*. [*Ed*].

The observations made on uncultivated sandy soils are applicable to uncultivated calcareous soils.

493

J. H. MILNE-HOME. **Observations on the Annual Increment of Spruce and Scotch Pine.** — *Trans. of the Royal Scottish Arboricultural Society*, Vol. XXIV, P. I, pp. 52-56. Edinburgh, Jan. 7, 1911.

Great Britain: Scotland

The following are the average data for various plantations:

Species	Age	Estimated present grow. stock cub ft.	Number of stems per acre	Mean annual increment cub. ft.	Current annual increment cub. ft.	Present % rate of growth
Scotch pine.	37	1200	710	32 1/2	51	4.24
Spruce	32	1320	450	41	91	6.98
Spruce	40	2800	286	70	116	4.16
Scotch pine.	40	1730	280	43	67	2.27

The first plantation was made on poor hill pasture, the second on land which had probably carried timber crops previously, on a fairly good surface soil of humus and loam resting on a hard sand subsoil. The third and fourth were made on a fairly steep slope; the land is a yellowish sand with a good surface covering of humus merging into a harder, stiffer subsoil. If account be taken of the relatively feeble density of the plantations, due perhaps to over thinning, these figures show that a high annual increment may be looked for even on soils of inferior quality, especially in the case of spruce.

494

Influence of Locality on the Seed of Scotch Pine (1). —*Journal of the Board of Agriculture*, vol. XVII, No. 10, pp. 856-858. London, Jan. 1911.

At the VIIth International Forestry Congress, Prof. Arnold Engler, of Zürich, gave a summary of the results obtained at the Swiss Research Station on the influence of locality on the seed of the Scotch Pine. The greater part of the seeds were collected in 1905, and sown in 1906. Since then the seedlings have been planted in various parts of Switzerland.

Switzerland

Up to the present the following seeds have been used:

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(1) Scotch Pine = *Pinus sylvestris*. [*Ed.*].

34 samples from Switzerland, 47° lat. N., altit. from 1250 to 6230 ft.;
5 » » Alsace-Lorraine, 49° lat. N., altit. from 430 to 920 ft.;
1 » » Rhenish Bavaria, 49° 30′ lat. N.;
1 » » East Prussia, 53° 40′ lat. N.; Johannisburger Heide;
3 » » France, 45° lat. N.;
1 » » Belgium, 50° 54′ lat. N.; Forest of Lanacken;
1 » » Scotland, Forres, 57° 40′ lat. N.;
5 » » Sweden, 57° to 66° 35′ lat. N.;
1 » » Norway, 60° 26′ lat. N.;
4 » » Russia, Perm, 55° 29′ to 59° 55′ lat. N.

The seeds were sown at Adlisberg, near Zürich, and after two years the seedlings were planted out at the following experiment Stations:

Number of experiment	Station	Altitude		Area		Number of seedlings
		Feet	metres	Acres	Hectares	
1.	Rheinau	1210	367	1.88	0.761	8.060
2.	Eglisau	1350	409	3.43	1.388	18.767
8.	Kumsberg	1710	518	0.77	0.311	4.324
3.	Bienne (Jura)	3510	1064	3.72	1.526	13.942
7.	Scanfo (Upper Engadine)	5900	1789	0.47	0.190	1.877
6.	Celerina	6100	1850	0.59	0.238	1.992
4.	Samaden	6300	1911	1.31	0.530	7.050
5.	Davos-Schatzalp	6330	1920	0.67	0.271	2.925

The results obtained may be summarised as follows:

Variations in the cone.

1) The form of the apophysis (1) varies from one tree to another in the same district. The cones of a given year are generally of similar form on the same tree, but often show divergences, and the same may be said of the apophyses.

In all the regions under observation the *plana, gibba* and *reflexa* forms of the apophyses were found.

Great diversity in the form of cones of *Pinus sylvestris* is the result of a fluctuating variability, and is also influenced to a great extent by exterior agencies.

The shape of the cone cannot be used for differentiation of Scotch pine into varieties, races, or forms.

2) It has been proved that the thickness of the apophyses increases regularly—*a*) in Sweden from the centre of the country northwards; and *b*) in the Alps with increasing elevation.

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(1) Apophysis: the prominence or ridge on the back of the cone scales. [*Ed.*].

Cones from the north and from the high Alps have a lower specific weight, and are more difficult to open than those of the lower districts of Central Europe.

3) The altitude and latitude have no effect on the size of cones. Cones collected in Auvergne, in the higher Alps, and in North Sweden, are remarkable for their brighter yellowish colour.

Characteristics of the Seeds.

1) Seeds from the lowland regions of Central Europe weigh more than those of the high Alpine regions or of the North. As a rule, the weight decreases with increasing altitude and latitude.

2) Pine seeds collected north of latitude 62°, and above Alpine altitudes of 5200 ft. have a feebler germinating capacity, and lose it more rapidly than seeds from more southern and lower regions. In the north and in the high Alps, both the seed and its wing are clearer in colour than elsewhere.

Condition of one to five-year-old Plants.

1) In all the stations from 1300 and 6200 ft. altitude the growth in height from seeds coming from Central Europe surpasses that from seed from the North or from high Alpine regions, as may be seen in the Swedish pines. Pines from the lower districts of north and central Switzerland, from Alsace-Lorraine and Rhenish Bavaria show the best growth.

2) In less elevated districts, pines from all regions begin to grow at practically the same time in spring; but with the Swedish and high Alpine pines growth ceases about ten days earlier than with any of the others.

When the former are cultivated in the higher stations, they shoot early. In the high districts, pines from the lower regions of Central Europe suffer from early frost, snow, and strong insolation, the other pines remaining comparatively unaffected.

Swedish pines, or those of the high Alps, have mostly a bushy and irregular appearance when grown in lower altitudes.

4) The needles of young northern or high Alpine pines are very short, being furnished with a strongly developed cuticle, which makes them more resistant.

The lowland Central European pines and those of Southern France are richer in resin than those of the North and East of Europe.

5) The leaves of all pines, especially those of North Sweden, and the high Alps, assume a more or less yellowish appearance in winter.

6) The leaf-shedding disease (Ger. *Schütte*) has been found on all varieties of the pine; those of high mountain origin suffer greatly, while the Scandinavian and French Pines have generally escaped this malady.

495 W. H. Whellens. **The Douglas Fir in Different Soils.**—*Trans. of the Royal Scottish Arboricultural Society*, vol. XXIV, part 1, pp. 47-51. Edinburgh, Jan. 1911 (1).

Great Britain: Scotland

Mr. Whellens describes a plantation of Douglas firs mixed with larches, in a sheltered site and on loamy clay. Three of the trees, planted in 1888, measured twenty years later, as follows:

No. 1.	Height	49 ft (14.86 m.)	Girth 4 ft from ground	3 ft 3 $^3/_4$ in. (1.004 m).
No. 2.	»	46 ft (13.95 m.)	» » » » "	2 ft 11 in (0.884 m.)
No. 3.	»	43 ft (13.04 m.)	» » » »	2 ft 10 in (0.859 m.)

Mr. Whellens classifies the soils in the order in which he considers them most suitable to this species: loamy clays; calcareous; light clays; sandy; peaty; gravelly.

He warns against repeating the mistake that was made with the European larch, of planting without taking count of suitability of soil and situation, because in this case the tree is very likely to suffer from parasites.

The greatest enemies of the Douglas fir at present are: *Hylobius Abietis* or "Pine Weevil", and the *Megastimus spermatrophus* among insects, and *Botrytis Douglasii* among fungi.

Pure planting is the best method of raising this tree, as there is no species that will keep pace with it in height-growth, and in preventing the development of the side branches, thus producing good timber.

496 T. C. Frye. **Height and Dominance of the Douglas Fir. *Pseudotsuga Douglasii.***—*Forestry Quarterly*, vol. VIII, No. 4, pp. 465-470. Cambridge (Bost.) Mass., December 1910.

United States: Washington

Mr. Frye has been studying the various causes which may lead to the remarkable development in height of the Douglas fir in its home in the North-west of the United States. He attributes this development to the following causes:

a) the fact that it can keep its twig-cells moist, which is caused by its ability to retain and absorb water, and also by the damp climate in which it grows.

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(1) Douglas Fir = *Pseudotsuga Douglasii*, Carr. = *Abies Douglasii*, Lindl. Compare with this *Bulletin*, Jan. 1911, n. 170. [*Ed.*].

b) Because it grows in semi-darkness, due to crowding, and perhaps equally to the dark days during its growing season.

Its local distribution largely depends on the distribution of mycorhiza, and on prevailing winds (1).

C. O. HANTON. **Measurements of Larch in the Forest of Dean and Neighbourhood.** — *Quarterly Journal of Forestry*, Vol. V, N. 1, pp. 34-42. London, Jan. 1911. 497

Great Britain: England

The form factors (1) of 44 Larch trees, cut in various parts of the forest of Dean, were as follows:

	Height	Form Factor
8 trees from	41 to 50 ft. (12.43 to 15.16 m.)	0.45
29 » »	51 » 60 » (15.47 to 18.20 m.)	0.46
4 » »	61 » 70 » (18.50 to 21.23 m.)	0,48
3 » »	71 » 80 » (21.53 to 24.26 m.)	0.48
	Average 60,5 » (18.34 m.)	0.465

Although these form factors were obtained from but a small number of trees, yet they are sufficiently close to those given for Scotch pine in Schlich's *Manual of Forestry* (Vol. III, p. 39) to warrant their provisional use for larch in England.

C. D. MELL. **California Walnut. Determination of Quality of Soil by Fibre Length of Wood.**—*Forestry Quarterly*, vol. VIII, No. 4, pp. 419-422. Cambridge, (Bost.) Mass. 1910. 498

United States

A series of 100 determinations made on the wood of the Californian walnut (*Juglans californica*, Wats.) collected in various localities, has given the following results:

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(1) Mycorhiza are those special organs formed in the root-system of many plants, in which fungine mycelia become intimately connected with the roots of the higher plant. The subterranean fungus thus powerfully aids the tree with which it connects its existence to absorb water, and to utilise the nitrogen and mineral constituents of the mould. Frank and Tschirsch first proved that many forest trees prosper only in soils where their roots become connected with subterranean fungi, forming mycorhiza.

See: B. FRANK, *Ueber die auf Symbiose beruhende Ernährung gewisser Baume durch unterirdische Pilze.* Bericht der deutsch. botan. Gesellsch. 1885. See also Frank's experiments in 1892.

E. STAHL, *Le sens de la formation des Mycorhizes* (trad. de E. GIUSTINIANI). Annales Agronomiques, XXVII. [*Ed.*].

(1) The form coefficients have been calculated according to the following formula:

$$\frac{\text{Vol. in cub. ft. when felled}}{\text{Height} \times \text{Basal area at 4 ft. 3 in.}}$$

[*Ed.*]

Soil	Length of fibres:		
	Average mm.	Maximum mm.	Minimum mm.
Deep black earth	1.134	1.554	0.714
Moderately moist sandy earth . .	1.097	1.428	0.672
Sandy, gravelly, dry earth. . . .	0.968	1.302	0.546

The influence of the soil on the character of the fibres is thus clearly demonstrated.

499 **Wattles, or Tannin Acacias in Sicily.** (Le Acacie a tannino).—*Bollettino del R. Orto botanico e Giardino coloniale di Palermo*, anno IX, fasc. 1-2-3, pp. 78-83. Palermo, genn.-sett. 1910.

Italy: Sicily

Acacias, as is well known, contain a large quantity of tannin in the bark and leaves. To facilitate the profitable cultivation of Tannin Acacias in Sicily, where many specimens are already growing in the open air, the following important species are mentioned:

1. *Acacia mollissima*, Willd. (Black Wattle). This grows naturally in many parts of Australia. It is cultivated on an area of many thousand acres in the State of Victoria, on more than 5 000 acres in New Zealand (Auckland district), and on as many as 200 000 acres in Natal. It might be cultivated successfully in various regions of Sicily except on calcareous soils. An adult tree may produce as many as 50 kg. of bark, which contains an average of from 30 to 40 % of tannin. It is estimated that the bark of this Acacia in Australia has a tanning power 5 times greater than that of oak.

2. *A. dealbata*, Link (Silver Wattle). This abounds in the South-West of Australia. The quality of the bark is inferior to that of the *A. mollissima*, on account of the smaller quantity of tannin which it contains. The cultivation of this plant in Sicily does not seem advisable.

3. *A. decurrens*, Willd. (Green Wattle). These trees are very numerous in Australia (New South Wales). Their cultivation is beginning in California, where 22.67 % of tannin has been extracted from the bark. It might be acclimatised in Sicily.

4. *A. pycnantha* Benth. (Golden Wattle). Very plentiful in South Australia, where there are vast plantation of it in New South Wales and Victoria. It is considered one of the best tannin species and can bear comparison with the *A. mollissima*. In Australia, the bark contains 30 % of tannin, the fresh leaves 6 %, and the dry leaves from 15 to 16 %. It might be cultivated in various regions on the shores of Sicily.

5. *A. penninervis*, Sieber. This acacia grows wild in Australia, and its cultivation has been begun in California. The bark gives as much as 45 % of tannin. The tree grows well in low temperatures, and has been successfully cultivated in the Botanical Gardens at Palermo.

6. *A. saligna*, Wendl. Abounds in the South-west of Australia, where it is at the head of the tannin-producing trees. It is also cultivated at the Cape of Good Hope and in Algeria. Its bark contains from 28 to 30 % of tannin, and the leaves from 7 to 8 %. It grows well in Palermo.

7. *A. melanoxylon*, R. Br. A South-east Australian species, which grows best in damp valleys. It can stand a temperature of 5 to 6 degrees below zero. It grows well in Palermo and at Naples. The bark contains about 20 % of tannin.

The article deals with other species of Acacia which may be utilised for the extraction of tannin, but which are considered less important.

H. S. Betts and Stowell Smith. **Utilisation of Californian Eucalyptus.** --- *U. S. Dept. of Agriculture, Forest Service, Circular 179.* Washington, 1910. **500**

United States: California

There are about 75 species of Eucalyptus in California, all imported from Australia. The chief of these are: *Eucalyptus Globulus, E. rostrata, E. corynocalyx, E. tereticornis, E. viminalis.* The timber has been very little used up to the present, and merchants are doubtful about replacing a wood whose properties they know well by one of which very little is so far known. Certain species of *Eucalyptus* that are found in California might well be used for firewood, piles, stakes, cross bars, mine stays, floorings, and for making furniture, casks, vehicles and the handles of tools.

Eucalyptus makes a very good firewood when it is dry, giving a fine flame and a pleasant odour. The *E. Globulus* is useless in the natural state for stakes, because it decomposes rapidly in the soil, but when treated with creosote it becomes very resistant. Used as piles in sea water, it is superior to all other untreated woods. It has also the qualities required for making railway sleepers.

The *Eucalyptus* is very much used abroad in ship building, and for wood constructions in general. Hitherto it has not been much used for mine stays.

The samples of furniture made with *Eucalyptus* wood are very successful; the wood has a fine grain and takes polish well.

The timber is sometimes used for making cart shafts, barrows, the spokes of wheels, the wooden parts of ploughs and other agricultural implements. The leaves of the trees are used for the production of Eucalyptus oil by distillation.

Effects of the Jaggery Industry on the Timber Supply of the Dry Zone of Burma.—*Department of Agriculture*, Burma. Bulletin No. 3, 1910, p. 15. Rangoon, 1910. **501**

British India: Burma

In this bulletin from Burma are collected some papers on the manufacture of "Jag-gery", a sugar extracted from the juice of the toddy palm with special reference to the effects of the industry on the timber supply of the dry zone of Burma (1).

In the dry belt of Upper Burma the Toddy Palms are very numerous. In the Lower Chindwin district there are said to be 7 500 000 toddy trees, 5 000 000 in Myingyan, and the figures for other districts are probably equally large and steadily growing. The toddy crop is the only crop which is practically certain in the dry belt. As alcohol and vinegar can be produced in many ways from cheap materials, it would not pay to convert the sugar-containing juice into either of these commodities. On the other hand the toddy palm industry is accompanied by several evils. It involves the cutting down of forest growth; it has prejudicially affected the rainfall through wholesale destruction of forests and is pressing on the fuel supply.

Wherever large areas of upland country, too poor to produce agricultural crops, and covered with a stunted scrub jungle are met with, it is invariably found that the villages which skirt the bases of these uplands have large toddy palm groves. From these jungles the fuel for domestic purposes and for toddy boiling is taken. It consists mainly of the timber of the "Dahat" (*Tectonia Hamiltoniana*), *Acacia arabica*, *Acacia leucophlæa*, *Acacia catechu*, the "Than" (*Acacia Oliveri*) and others.

502 G. Bi Frankforter. **Waste Wood and its Utilisation.**—*The Journal of Industrial and Engineering Chemistry*, Vol. 3, No. 1, pp. 4-10. Easton, Pa., January 1911.

United States

Mr. Frankforter points out that, generally speaking, nothing is known of the amount of timber that is lost in cutting up a tree. The average yield of a tree, according to several determinations are as follows:

Wood	34.84 %
Waste	65.16 %

Neither the leaves nor the twigs or small roots are included in the waste, but it includes the tops, the stumps, the slabs (from 5 to 15 %) and the sawdust (from 20 to 25 %).

The loss sustained in the United States every year is estimated, on the basis of these figures, at 150 million tons.

The waste is utilised:

1) as wood, by working the raw material by improved machines;
2) as fuel, for producing heat, and power; on the basis of 7 800

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(1) The "Palmira" or Toddy Palm (*Borassus flabelliformis*) is a tropical African species now largely cultivated throughout India, Burma and Siam; its stems are often used for houseposts, and its leaves for writing upon; the sap yields sugar (jaggery) and a liquor (toddy). [*Ed.*].

British thermal units per pound of wood and of 13 000 units per pound of coal, the above waste would represent 90 million tons of bituminous coal;

3) by destructive distillation, with production of charcoal, tar, methylic alcohol and acetic acid. The experimental data for the commonest species in the United States were (1):

		Norway Pine	Southern Pine	Douglas Fir
Charcoal	°/₀	24	22	24
Tar and terpenes .	»	14	14	14
Pyroligneous acid .		37	38	38

4) for turpentine and resinous matter which may be extracted by economical methods. Since the United States has 13 500 000 tons of resinous waste at disposal, containing an average of 10 °/₀ of resinous material from which 22 °/₀ of turpentine can be extracted, we should thus have 297 000 tons of the latter, that is to say, a quantity sufficient to ensure the world's consumption for four years;

5) as cellulose and paper. The most suitable process is the treatment by soda, which gives the following average results:

	Wood pulp °/₀
Norway pine stumps	27
Douglas Fir ›	24
Fir sawdust	22
Southern Pine sawdust (2)	23

Lean fir wood gives the highest yield. It may be estimated, on an average, that half the waste can be used as pulp, with a yield of 22 °/₀.

Packing in Poplar Wood. — *L'Agriculture Commerciale.* Paris, Décembre 25, 1910. **503**

France

The poplar is the species most in demand in the packing industry, agricultural products being nearly always packed in poplar wood boxes. For this reason M. Blanchin, commercial agent of the Paris-Lyon-Mediterranée Railway Company, strongly urges proprietors of lands where practically nothing else will grow, not to let these lands lie idle, but to plant them with slips of poplar, or rooted slips which grow more quickly. The landowner who plants poplars provides himself with a capital which will accumulate by itself, improve the condition of his land and add to the beauty of his property. Poplar-wood is steadily increasing in price.

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(1) Other determinations, done in different countries, of the products of Wood-distillation give rather different results. Thus, in France, by distilling the wood of the *Pinus maritima*, it was found that 100 kg. of wood yielded 25 kg. of charcoal, 2 kg. of glacial acetic acid (obtained from pyroligneous acid), 7 kg. of tar and 0.5 kg. of methyl alcohol.

See: CAMILLE VINCENT, *Carbonisation des Bois en vases*, etc. Paris, 1873. E. BARILLOT, *Sur le rendement des diverses essences de bois en charbon, alcool methylique et acide acetique.* « C. R. de l'Acad. des Sciences, vol. 122, pp. 469, 725, 1896.

These and other data on wood distillation are collected in ITALO GIGLIOLI, *Malessere agrario ed alimentare in Italia.* Portici, 1903, p. 386. (*Ed.*).

(2) Longleaf Pine, *Pinus palustris*, Mill., a common and important Conifer in the South of the United States. [*Ed.*].

504 A. B. Snow. **Rubber Planting in Burma.**—*The India Rubber World*, p. 124. January 1, 1911.

British India: Burma

In a communication from Victoria Point, Lower Burma, attention is called to the cheapness of rubber planting in that country. It is estimated that the cost of planting 2 000 acres in *Hevea*, and maintenance for five years —at which age the trees should become productive— need not exceed £6 (= $ 30) per acre, or about 375 frcs. per ha. Mr. Snow mentions trees five years old, and now 27 inches in girth, three feet above the ground, as producing $^{3}/_{4}$ pound per tree. Transport is easy; there are telegraph communications. The climate is good.

505 **Influence of Artificial Fertilisers on the Production of Latex in the *Manihot Glaziovii.*** (Die Wirkung von Kunstdunger auf den Kautschukertrag bezw. Latexausfluss bei *Manihot Glaziovii*). — *Gummi Zeitung*, Jan. 20, 1911.

Hawaii

The first experiment in the manuring of rubber plants in Hawaii for the purpose of increasing the production during the tapping period, was made at Keanoe; the *Manihot* trees were treated with sodium nitrate at a depth of 4 inches. The experiments were made on three sets of plants, $^{1}/_{2}$ pound of fertiliser per tree being given to one set, $^{1}/_{4}$ pound each to another set, and nothing to the other, or controlling set. The production of each unmanured tree during the experimental period was 1 to 2 ounces of dry rubber, that of the plants treated with $^{1}/_{4}$ pound of manure 1 to 3 ounces and that of the trees treated with $^{1}/_{2}$ pound, 2 to 3 ounces. The action of the fertiliser was apparent within 48 hours.

Other similar experiments demonstrated the prompt and effective action of sodium nitrate on the secretion of rubber in the *Manihot Glaziovii*.

506 ***Funtumia elastica* and Para (*Hevea*) in Southern Nigeria. Tapping and Rubber Preparation.**—*Southern Nigeria*, No. 30 of 1910. *Annual Report of the Forestry and Agricultural Department for the Year 1909*, N. 30, pp. 7-8. Lagos, 7 Nov. 1910.

Southern Nigeria

There are in Southern Nigeria two ways of tapping *Funtumia elastica* for latex, the excision and the incision systems. By the excision method deep cuts as far as the cambium are made, while by the incision system only shallow channels are opened, just deep enough to allow the latex to run down the tree; incisions are then made into these channels by means of a pricker. Of the excision tapping, the most satisfactory results, so far as the quantity of latex is concerned, were obtained from the spiral system; however, the experiments carried out with the excision method have been on the whole disappointing.

Incision tapping by means of a pricker is the best method for *Funtumia* trees, as comparatively little damage is done to the tree, which can be tapped three times a year.

Of the cold methods of preparing *Funtumia* rubber, (i. e. coagulation without boiling the latex), *purub* and acetic acid had no effect on the *Funtumia* latex. Good biscuits can be prepared by adding formalin or absolute alcohol to the latex Good thin biscuits can be made by simply boiling the latex and then washing and pressing it, the principal thing being to boil as small a quantity of latex as possible at a time, so as to ensure the preparation of very thin biscuits, which are then easily dried.

One hundred Para trees (*Hevea*), 8 years old, were tapped at Orugbo, Shorodu District. The average yield obtained per tree from 23 tappings was 6 1/2 ounces (184.21 grammes). Assuming that the trees can be tapped 100 times a year, this would give a yield of 1 1/2 lbs (0.679 kgs). Trees at Ebute Metta about 15 years old, which had been tapped the foregoing year, yielded 1 lb. 4 oz. (0.566 kgs) from 26 tappings; this amounts to a yield of 5 lbs (2.265 kgs) rubber per tree and year from 100 tappings.

These tapping experiments show that *Para* will still in West Africa, be far superior to *Funtumia*, and that it should take the place of the latter where planting is to be done in the moist zones.

Methods of Collecting and Preparing *Landolphia* Rubber in Southern Nigeria. -- *Southern Nigeria*, No. 30 of 1910. *Annual Report of the Forestry and Agricultural Departments for the Year 1909*, pp. 8-9. Lagos, 7 Nov. 1910. 507

Southern Nigeria

The methods of collecting and preparing *Landolphia* rubber by the Munchis inhabiting the Obudu District of the Eastern Province of Southern Nigeria, are as follows: The stems are invariably cut down to within two or three feet of the ground and the rubber allowed to coagulate before the stems are cut into foot-long pieces and stripped of bark, which is pounded and washed alternately till the shredded bark is almost eliminated. The result is irregularly shaped pieces of rubber containing about 20 per cent of shredded bark. The pieces of rubber are then heated in boiling water, softened and pressed into an irregularly shaped ball, bound together by thin strips of pure rubber, viz., latex coagulated by salt as it exudes from wounds in the bark of a contiguous *Landolphia*.

508 J. Dybowski. **Rubber from Jeloutong Gum.** — *C. R. Acad. Sc.*, No. 2, pp. 98-100. Paris, Janv. 9, 1911.

Malay States

A new field is opened by the extraction of rubber from various substances in which rubber is more or less closely mixed with bodies analogous to esins. One of these substances, the *Jeloutong gum* or *dead Borneo*, is of considerable importance.

The *Jeloutong* comes from a latex furnished by an Apocynacea, the *Dyera costulata*, Hook. After coagulation, this latex furnishes a white gum that still contains a considerable quantity of water (40 to 50 °/$_0$). *Jeloutong* contains rubber in a proportion that is rarely below 10 °/$_0$ and often above 20 °/$_0$.

On account of the great abundance of *Dyera* in the Malay States and the neighbouring regions, the strength of the trees producing the latex and their high yield, the *Jeloutong gum* is sold at a very low price. The extraction of rubber from *Jeloutong* is therefore of considerable interest and offers an important addition to the raw material of this industry.

509 Yves Henry. **The Heveas cultivated in West Africa.**—*Journal d'Agriculture tropicale*, No. 114, p. 363. Paris, Dec. 1910.

est Africa

Mr. Henry has been making a series of experiments on the value of a certain form of *Hevea* called *Spruceana* at Lagos, and *Medeiros* at Porto Novo, and concludes that this form is the only one besides the *Hevea* of Ceylon which has given satisfactory yields on the West Coast. Its value is definitely recognised.

Contrary to the opinion of Mr. A. Chevalier, planters should guard against multiplying Heveas of the species grown in Camayenne and Dabou, which yield little or nothing, and the value of which is very variable in any case. Besides giving a very poor yield, the quality of the rubber is known to be very uncertain. All the forms of *Hevea* found at Camayenne were of the *H. brasiliensis* species.

Live stock Breeding.
Aviculture. — Beekeeping. — Silk-Production. — Animal Industries.

B. TACKE. **Influence of Litter and General Condition of the Stables on the Utilisation of Food.** (Ueber die Abhängigkeit der Futterausnützung von der Beschaffenheit des Stalles). (*Oldenburgisches Landwirtschaftsblatt fur Agrikulturchemie*, No. 40, f. X, 1910, pp. 437-439).—*Biedermanns Zentralblatt fur Agriculturchemie*, Heft 2, pp. 99-109. Leipzig, 1911. **510**

Germany

Mr. Tacke gives an account of some experiments carried out during the winter of 1908-9, the spring of 1909 and the following winter, at the Experimental Farm of Widdelswehr and Maibuschermoor, for the purpose of determining to what point the stable litter influences the satisfactory utilisation of food in stall fed animals. The last experiments were made from November 10, 1909, to March 31, 1910, on three groups of oxen of six head each, the age of the animals being about two years. The daily ration was composed of hay, straw, potatoes and mangels. The total quantity consumed was as follows:

Group 1 (peat litter)	10 548 kg.
» 2 (straw litter). . . .	10 693 »
» 3 (no litter).	10 662 »

The following increases of weight were observed:

	Total weight At beginning of experiment kg.	At end of experiment kg.	Increase of weight kg.
Group 1	2069	2449	+ 380
» 2	2007	2334	+ 327
» 3	2059	2282	+ 223

The results obtained are in accordance with the observations previously made at the same Experimental Farms, and they leave no doubt as to the influence of the litter. The increase of weight amongst isolated subjects was considerable and was certainly due to the warm and comfortable litter, which allowed the beasts to lie down frequently and for longer periods than when they have no litter to rest upon.

It may be considered in general that the noticeable increase of weight which results from the better utilisation of their food by animals provided with an abundant litter repays the farmer, in most cases, for the greater outlay.

511 J. K. GREISENEGGER. **Influence of Mountain Grazing on the Production of Milk.** (Ueber Alpmilch von Montafoner Kuhen und Beeinflussung der Milchleistung durch verschiedene Faktoren). — *Wiener Landwirtschaftliche Zeitung*, 61 J., No. 9, pp. 87-88. Wien, Feb. 1, 1911.

Austria

The partial results are given of an experiment on the influence of mountain pasturage on cows of the grey-brown Vorarlberg breed (Montafoner).

Mr. Greisenegger confirms the advantage of mountain grazing, not on account of the immediate effect of a larger and richer production of milk (although the better quality of the products obtained on the mountain are not to be underrated), but on account of the favourable influence on the health of the animals and the higher value from the breeding point of view which derives from upland grazing.

In regard to the influence of the meteorological conditions, he has come to the following conclusions:

1) Cold and damp weather acts unfavourably on the production of milk;

2) A more abundant and richer milk is obtained in warm weather;

3) Milk is produced in larger quantities when the atmospheric pressure is low, being richer in fatty bodies and in dry non-fatty substances;

4) The contrary effects are observed when the atmospheric pressure is high;

5) These two influences compensate one another;

6) Rapid and frequent changes of temperature and of atmospheric pressure have an unfavourable influence on the quantity and contents of the milk;

7) The temperament of the animals is of great importance in regard to these effects; while some cows react considerably to the whole of these influences, others are scarcely affected by them.

512 **Alfalfa as a Wool Producer.** — *Farmer's Advocate*, Vol. XLVI, N. 958, p. 176. London-Ontario, Feb. 2nd, 1911.

Canada: Ontario

During the winter of 1908-09, the sheep of the Ontario College of Agriculture were fed on Timothy and ordinary clover, and during the following winter on Alfalfa (Lucerne). Each year, at the shearing period, that is to say, in the spring, the fleece was weighed.

The following table shows that all the breeds submitted to experiment gave more wool when fed on Lucerne than on the other forage.

	Average weight of wool With rations of Timothy and ordinary Clover	 With rations of Lucerne	 Increase % in favour of Lucerne
Leicester	9.14	9.67	5.3
Shropshire	9.30	9.47	1.8
Oxford	9.57	10.35	8.1
Average of all breeds. . . .	9.34	9.83	5.2

G. Arezzo. **On the Chemical Composition of *Scorpiurus subvillosa*, a drought-resisting forage plant.** (Sulla composizione chimica dello *Scorpiurus subvillosa*). — *L'Agricoltura italiana*, Anno XXXVII, F. 688, pp. 16-20. Pisa, 6 Genn. 1911. **513**

Italy: Sicily

The following were the chief average figures given by some chemical investigations made in the Agricultural Chemical Laboratory of Pisa with the object of determining the value of *Scorpiurus subvillosa* (1) as a food for cattle:

	Dry sub. %	Total nitrogen %	Protein nitrogen %
Entire plants.	15.05	0.414	1.85
Roots	15.06	0.417	1.00
. . . .	14.70	0.412	1.85

In some parts of Sicily this sponteneons leguminous plant increases very much the value of pasture land.

E. Bugnon. **Green Food for Horses in Winter.** — *La Terre Vaudoise*, 3^e^ année, No. 4. Lausanne, Jan. 28, 1911. **514**

Switzerland

Many farmers are tempted to give mangels to their horses during the winter, but refrain from doing so fearing that it might be harmful to them.

Mangels are a very watery food (containing up to 85 % of water), and it might have a bad effect to give a large proportion of these zoots in the horse's ration; the animal would be absorbing a larger quantity of water than is necessary for his welfare. The horse, in fact, is rather dry in temperament; his respiration gives but a small quantity of water, in no way to be compared to the amount given off by the much moister respiration of cattle.

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(1) *Scorpiurus subvillosa* Linn. Leguminosa of the Mediterranean region. It grows along the coast-land of the Italian peninsula, in Istria and in the Italian islands. Also in Asia Minor, Northern Africa, ecc. *

See Giov. Arcangeli, *Flora italiana*, Roma, 1894, p. 512

In Malta this forage plant, known under the name of *Erba bruca* is particularly appreciated, as it grows on stony dry ground, giving a good pasture both for cattle and for sheep.

See: Antonio Schembri, *Sulla coltivazione della Sulla e dello Scorpiurus subvillosa (Erba bruca).* Atti dell'Accademia dei Georgofili di Firenze, vol. XXX, 1852, p. 387. [*Ed.*].

Nevertheless, a reasonable quantity of beets does not do the horse any harm. The ration should be calculated in accordance with the temperament of the animal, the kind of work to which it is subjected and the nature of the dry food given.

A farm horse, which has several periods of rest in the stable, eating dry food only during this time, such as hay, straw and oats, will enjoy a small daily ration of from 2 to 4 kg. of mangels. This addition would not be so necessary, however, if the horse eats hay only and no oats. Mangels assist digestion and the circulation of the blood in horses which eat a large quantity of oats, becoming thereby somewhat heated and enervated by this exciting diet. In this case carrots also are particularly recommended for keeping the animal in good health.

Carrots are nearly as watery as mangels but they contain pectine, which the writer considers a strengthening principle which is particularly useful for the horse. They invigorate the mucous membranes and make the coat glossy, and, by facilitating digestion, increase the weight of the body, to an extent that is noticeable even after a few weeks only of this feeding.

The same may be said of Jerusalem artichokes or topinambours. These have the great advantage of not being damaged by frost if left in the ground till the beginning of spring, thus providing the farmer with a fresh and agreable forage at a time when all other roots are exhausted. The Jerusalem artichokes should be well washed, and can be given in large rations without any inconvenience. They are even more nourishing than carrots, and horses which are out of condition are rapidly set up again by this food, and put on flesh (1).

515 G. E. DAY. **Maize as a Food for Stock: Gluten Meal, Gluten Feed, Hominy Feed, etc.** — *The Farmer Advocate*, pp. -10. January 5, 1911.

Canada

The grain of maize may be either white or yellow in colour, but investigation shows that there is no relation between the colour and the feeding value of corn. The grain of flint maize contains a little more protein, as a rule, than that of dent maize, but it is a little lower in carbohydrates or starchy matter.

For fattening comparatively-matured animals, no cereal grain equals maize; but, in the case of very young animals which are rapidly building up the muscles and bones of their bodies, maize should always be fed with some other food which will make up for the deficiency of maize as a bone and muscle former.

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(1) Jerusalem Artichokes are tubers containing quite as much water (80 %) as the roots of mangels. It is not the amount of water in the mangels that can be harmful to horses, but some active principle contained in these roots. [*Ed.*].

There are several important by-products from the maize grain. One of the most common of these is *Gluten Feed*, which is composed of the gluten of the maize and the bran or outside skin of the grain ground together. This by-product occurs in the manufacture of starch from maize. Another by-product of the starch factory is *Gluten Meal*, which consists of the gluten of the maize, but does not contain any of the bran. Another by-product is *Hominy Feed*, which is a by-product in the manufacture of hominy, and consists of the bran or hull of the corn, together with some of the starchy matter.

The following table shows the dry matter and the digestible nutrients in 100 pounds of the maize grain and in its leading by-products (1):

	Dry matter in 100 pounds lbs.	Digestible nutrients in 100 pounds		
		Crude protein lbs.	Carbo-hydrates lbs.	Fat lbs.
Dent maize	89.4	7.8	66.8	4.3
Flint maize	88.7	8.0	66.2	4.3
Gluten meal	90.5	29.7	42.5	6.1
» feed	90.8	21.3	52.8	2.9
Hominy feed	90.4	6.8	60.5	7.4

Of the dried product of the maize plant, we have *Maize Fodder* and *Stover*. By Maize Fodder is meant the whole maize plant, including the ears, whereas stover refers to the maize plant with the ears removed. The following table shows the dry matter and digestible nutrients in 100 pounds of Fodder Maize, Maize stover, together with Timothy hay and oat straw, for purposes of comparison.

	Dry matter in 100 pounds lbs.	Digestible nutrients in 100 pounds		
		Crude protein lbs.	Carbo-hydrates lbs.	Fat lbs.
Fodder maize	57.8	2.5	34.6	1.2
Maize stover	59.5	1.4	34.6	1.2
Timothy hay	86.8	2.8	42.4	1.3
Oat straw	90.8	1.3	39.5	0.8

Many discussions have arisen regarding the relative value of silage and dry corn or maize fodder. As to feeding results, it has been found that there is not a very large difference between the milk produced from an acre of maize, fed in the form of dry maize fodder, and an acre af corn (maize), fed in the form of silage. At the Vermont Experiment Station, silage produced 11 per cent more milk than the dry maize fodder from an equal area. At the Wisconsin Experiment Station silage produced 5 per cent more milk and nearly 7 per cent more fat than the dry fodder from an equal area. Apparently, the acceptability of a succulent ration, such as silage, has an influence upon the milk yield of the cow.

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(1) Compare with: JAMES HENDRICK, *Experiments with Gluten-Feed*. Transactions of the Highland and Agricultural Society of Scotland, 1905, p. 1: « In any quantity which was tried in the experiments, it was found that the Gluten-Feed agrees well with cattle and gives them a good appearance ». [*Ed.*].

Silage is also attracting attention as a food for tiding cattle over periods of short pasture during the summer, and a summer silo is a very valuable asset to the dairy farmer.

It does not take a particularly heavy crop of maize to produce twelve tons of silage per acre. Twelve tons of maize silage contain, approximately, 336 pounds of digestible protein.

The following table shows the dry matter and digestible nutrients in 100 pounds of maize silage, turnips, and mangels:

	Dry matter in 100 pounds lbs.	Digestible nutrients in 100 pounds		
		Crude protein lbs.	Carbo-hydrates lbs.	Fat lbs.
Maize silage	26.4	1.4	14.2	0.7
Swede turnips. . . .	11·4	1.0	8.1	0.2
Mangels	9.1	1.0	5·5	0.3

It will be noted that the silage contains considerably more dry matter than roots; and experimental work, so far as it goes, indicates that the dry matter of silage is practically equal to the dry matter of roots in the case, especially, of matured animals.

There is probably no crop which supplies more feed per acre than the maize crop, though it is a somewhat one-sided food, and must be combined with foods which will make up its deficiencies.

516 **Rations for Fattening Swine.** — *The Ohio Farmer*, Vol. CXVVI, No. 27, p. 4. Cleveland (Ohio), Dec. 31, 1910.

United States: Ohio

The problem of the fattening of swine is one of general and well justified interest in the maize belt of the United States. What substances ought to be combined with the maize, and in what proportions, in order that the best results may be obtained?

The Ohio Experimental Station has been able to reply to this question of the farmers, thanks to a series of experiments made by it during the spring of 1910: 40 pigs (aged 6 months), divided into 8 groups, were put on the following different daily rations for 84 days:

1st Group: Maize only.
2nd » 2 parts Maize and 1 part Soy beans.
3rd » 5 » 1 »
4th » 11 » 1
5th » 4 » 1 part tankage.
6th 6 » 1
7th » 29 » 1 »
8th » 5 » 1 part oil cake.

The maize was ground and mixed with the supplementary food, sufficient water being added to form a consistent mash, the content of which in protein was guaranteed to be 60 %.

The results lead to the following conclusions:

1) There is a greater gain in weight with a mixed ration than with the maize alone;

2) The Soy beans, oil cake and tankage, used in different proportions, generally gave the same results. The formula for the various mixtures must therefore be determined by the commercial value of the products used at the time.

NEUBAUER. Water Content of Molasses Feeds. (Wassergehalt der Melassegemische. — *Verhandlungen der Hauptversammlung des Verbandes landw. Versuchs Stationen im Deutschen Reiches zu Hannover*).—*Die Landwirtschaftliche Versuchs-Stationen*, B. LXXIV, H. III-V, pp. 389-392. Berlin, 1911. 517

Mr. Neubauer proposed the following motion: Germany

1. In the control of molasses feeds, the water content ought always to be determined.

2. The maximum water content of feeds rich in molasses ought to be 20 %; those which contain a smaller quantity of molasses should have a maximum water content in proportion.

3. In any case, a maximum of 23.5 % of water ought to be considered as a normal basis in molasses used in the preparation of molasses feeds.

This proposal has been approved by the Union of Agricultural Experiment Stations of the German Empire (*Verband der Landw. Versuchs-Stationen im Deutschen Reiche*).

518 C. S. Fuchs. **Grape Seed Cakes.** (Ueber Traubenkernkuchen). -*Chemiker Zeitung*, No. 4, pp. 30-31. Cothen, Jan. 1911.

Germany

This is an account of the investigations made by Mr. Kling on oil-cake made from grape seeds, the results of which coincide with those obtained by Mr. Fuchs:

	Kling %	Fuchs %
Moisture	10.14	10.6
Raw protein	12.68	11.5
Fat	5.05	4.36
Non-nitrogenous extractive matters	32.83	—
Raw cellulose	36.06	—
Ash	3.24	3.25

Kling is of opinion that the grape-seed cake is not a good food, on account of the cellulose, which is to a large extent indigestible.

Fuchs found in fact that less than half of the oil cake was rendered soluble after being left to digest in a solution of pepsin and hydrochloric acid for 72 hours. He also found that, out of a material containing 11.5 % of protein, the digestible quantity was equal to 5.3 %.

Mr. Fuchs is investigating the extraction of oil from grape seeds, and affirms that the use of oil cakes made from these seeds does not seem to be practical, at any rate in Germany.

519 Weissiger and Neumann. **Beer Yeast in the Feeding of Cattle.** — *Annales de Médécine Vétérinaire*, No. 2, pp. 104-105, 60ème année. Fev. 1911

Germany

Drs. Weissiger and Neumann, of the Agricultural Station at Mockern, have verified that yeast, dried in the form of thin flakes, is no longer capable of setting up fermentation, even after it has been 24 hours in a 10 % glucose solution, so that there is no fear of digestive troubles for cattle from the ingestion of dried yeast.

Dried yeast has the following composition:

Water	8	per cent
Proteins	50	
Fatty matters	0.8	»
Non nitrogenous matter	26	»
Cellulose	5	»
Ash	7	»

Dried yeast is therefore a concentrated food, very rich in proteins and carbo-hydrates, with a high nutritive value, and should be given in moderate quantities.

The experiments doses by Messrs Weissiger and Neumann, especially those with 300 gr. of dried yeast per day for sheep, have demonstrated that this is a concentrated food of great value, $^9/_{10}$ of the dry substance, of which $^8/_{10}$ are gross protein, being assimilated.

N. O. Hofman-Bang. **Feeding Farm Horses. Experiments made in Denmark.** (Fordringsforsg med Heste). — *72de Beretning fra den Klg. Veterinar-og Landbohöjskoles Laboratorium for Landökonomische Forsög*, pp. 1-62. Köbenhavn, 1910. **520**

Denmark

The principal results of three series of experiments made on farm horses were as follows:

1) If maize be used in the ration instead of oats, a kilogram of Indian corn is more than equal to a kilogram of oats, and there is also a considerable economy in straw;

2) Out of a daily ration of from 10 to 12 kgs. of oats, 2 kgs. might be replaced by beets, 1 kg. of dried beet being equal to 1 kg. of oats;

3) If the effects of whole straw and chopped straw be compared, it is found that there is no sensible difference in the development of the animals; therefore, 1 kg. of whole straw equals 1 kg. of chopped straw, as is shown by the following average data obtained during 12 to 14 weeks, with 5 to 6 hours' labour per working day:

Daily ration				Average weight of animal		
Oats kg.	Hay kg.	Straw (whole) kg.	Straw (chopped) kg.	Before experiments kg.	After experiments kg.	Difference kg.
7.0	1.0	—	8.1	626.1	626.5	+ 0.4
»	1.0	8.0	·	626.0	622.0	— 4.0

Mutton Imports. — *The Farmer and Stockbreeder*, p. 158. London, Jan. 23, 1911. **521**

Great Britain

During the past year Great Britain imported only 427 live sheep, all from Canada. The supply of imported mutton during the past year was far in excess of former importations, the total amounting to 5 556 318 cwt. (1 cwt. = kg. 50.8). Since the beginning of the century there has been an enormous increase in the quantity shipped from Australia.

The New Zealand supplies were also higher than ever in 1910. Uruguay sent 38.39 per cent more than in 1909. The Argentine supplies were 1.13 per cent less than in 1909, and those from Holland 24.74 per cent less in 1910 than in 1909.

522 **French Cattle in Germany.** (Das bei uns importierte französische Vieh). —*Deutsche Landwirtschaftliche Presse.* Berlin. Dec. 24. 1910.

France. Germany

A considerable number of French horned cattle are imported into Germany, where they are very much esteemed on account of the excellent qualities of the meat of French breeds. The Normandy breed takes first rank among the animals imported; the hair is blackish-brown, marked with white, the breed is crossed with the English Shorthorn. There are two kinds of Normandy breed: *Cotentin*, for butcher's meat and *Auge*, for milk.

Among the Flemish-French cattle there are some excellent breeds: Boulognese, Artesian, Mazollaise, and Terquenarde. Some specimens of the Charolaise and Nivernaise breeds attain to 1000 kg. live weight, and they are naturally preferred; the Limousin, which reach 850 kg. in weight, the Aubrac and the Salers, which weigh between 800 and 900 kg., are also highly esteemed. Cattle of the Gascon and Garonne breeds weigh less.

The cattle imported into Germany from France are of excellent quality, sound and tranquil, and its meat is of the best, owing to excellent feeding and pasturage.

523 **Moravian Cattle.** (Das Mährische Rind). - *Deutsche Landwirtschaftliche Presse*, p. 81-83. Berlin, 28 Januar, 1911.

Austria: Moravia

The German Agricultural Association of the Margravate of Moravia is about to publish two works, one on the cattle of the Moravian Sudeten mountains and the other on the spotted cattle of South Moravia.

The following data have been obtained regarding the characteristics of the Sudeten breed, as the result of some careful experiments made with 142 cows:

Yield in milk per cow per year (excluding the milk taken by the calf).	1662 kg.
Average weight of each cow	421 »
Milk obtained per 500 kg. of live weight.	1073

The cows with the heaviest live weight give the smallest quantity of milk, and whenever an attempt has been made to increase the weight by crossing the breed, the milk yield has further decreased. This was especially the case in crosses with the Simmenthal cattle.

The spotted cattle of South Moravia have the treble advantage of possessing excellent qualities for milk, fattening and work.

The South Hanna cows, however, which are magnificent animals, give very little milk. Their hide is thick and soft and their hair rather coarse, the udders are relatively small and not well developed.

The average daily production of milk of a cow of the South Moravian breed is 12 to 15, or in rare cases 18 litres from the third to the fourth calving. The weight of these cows varies from 438 to 662 kg.

The peasants do not breed oxen, except in the mountainous districts of South Moravia. In the other parts of the province cows only are raised, for milk, for fattening and for work in the fields.

W. C. RENOUF. **Buffaloes, Sheep and Goats in the Punjab.** — *Cattle and Dairying in the Punjab.* Lahore, 1910, pp. 19-48. **524**

British India: Punjab

The value of the buffalo is yearly more appreciated by the Punjab cultivator. Before the spread of canal irrigation buffaloes were confined almost entirely to the tracts bordering on the great rivers of the Punjab and in low-lying flooded regions, such as the *Naili* of the Sarusti and Ghaggar streams. Each tract produced a distinct type, the Ravi buffalo being then, as it still is, the best known variety.

At present the Kundi buffaloes (so called from their small spiral horn), characterised by a comparatively fine skin and great compactness, are considered the favourite breed. They are to be met with in the canal-irrigated villages of Rohtak and Hansi, and the tradition is that this breed owes its origin to importation from the Ravi Bet.

The Jamna Khadar, the Ghaggar and the Naili tracts of Karnal, Patiala and Hissar produce vast numbers of buffaloes, often of great size but of inferior quality compared with the Kundi type.

The Lyallpur colony now raises buffaloes in vast quantities.

Sheep and goats are kept in considerable numbers throughout the Punjab. Sheep are valued for their wool and skin, for the meat they provide and for their milk. Sheep dung is also highly prized as manure. In Lyallpur the herdsmen receive Rs. 1 per acre (3.70 frs. per hectare) for herding sheep for some time on plots to be sown with sugarcane and cotton.

The number of sheep has increased especially in the north-western, western and south-eastern districts and in Kangra, where the best sheep are produced. They graze on the fallows and are rarely stall fed In the Central Punjab the number of sheep has decreased during the last 5 years, as cultivation is too intense in these districts to provide good grazing, and the heavy canal irrigation makes the ground too wet for them in the monsoon season. Sheep prefer the drier tracts.

The valuable fat-tailed sheep is confined to the Kala-Chitta range of the Attock district and the hill tracts of Shalpur and Yhelum. In the plain districts little distinction of breed is recognized, but the best sheep come from Bikanir, Hissar and the Narnaul tracts of the Patiala State. These animals are said to be the largest sheep bred in the Indian plains and are highly prized for their wool. Of the Himalaya hill sheep those from Kulw, Mandi, Suket and Sirmur are most esteemed. The sheep of the Bar and Thal country are very numerous, but inferior in quality, owing to the scanty grazing available.

Sheep are sheared twice a year, in April and October, the latter shearing being generally the more productive. The wool is usually put upon the markets in a very dirty state. A very large quantity of wool, including the best fleeces, is exported. The skins are sold to wandering traders who collect for the large export trade at Amritsar and other centres.

The ewe has offspring when about a year old and produces about 5 lambs in the next three years. She gives about 6 chittacks (1) of milk a day for 4 months. The milk is rich in butter fat and can be made into first class *ghi* (2) either by itself or mixed with cow or buffalo milk. The use of the sheep as a dairy animal is commonest in the Thal.

Goats are most numerous in the south eastern districts. No special breeds are distinguished, but the goats of Lawa in the Talagang Tahsil, and of Dajal in the Dera Ghazi Khan are exceptionally good. Goats are valued for their dung, especially as manure for tobacco. The she-goat bears when a year old, producing one kid or sometimes two in the year. She will produce altogether 7 or 8. She-goats are milked twice a day, and give from 14 to 20 chittacks of milk daily for four months. A good she-goat will yield as much as 2 or even 3 seers (3). The milk sells well, as it is supposed to have a medicinal value. Goats are sheared in the spring and again in the autumn, if sufficient hair has grown. The male stock both of sheep and goats is largely disposed of for meat.

525 Greatest Buffalo Herd to be Removed to Mexico. — *Colman's Rural World*, p. 5. St. Louis, Mo., Dec. 7, 1910.

The largest buffalo herd remaining in America is to be taken from Goodnight, Tex., to Mexico. This ranch is but one of the many that are now being moved to Mexico. The cutting up of the large cattle ranches into small farms has been the cause, to a great degree, of the exodus.

The farmer from the Eastern, Southern, and Central Western States is crowding out the stockman, and while Iowa and other States show a falling off in population, the Western States are showing an increase of population together with a decrease of live-stock raisers. Land is too valuable in Southwest Texas to permit the retention of the big ranch where only cattle are raised.

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(1) *Chittack* = 0.128 lb., or about $^1/_{16}$ of a litre.

(2) Clarified butter, largely prepared and employed for domestic cooking in India. (WATT, *Dict. of the Economic products of India*). The manufacture of *ghi* is the principal home industry of the Punjab. (*Cattle and Dairying in the Punjab*, p. 38. Lahore, 1910.

(3) *Seer*, or *Ser* in the primary standard of weight in India. It is equal to 1 kg., equal to 2.205 lbs avoirdupois. [*Ed.*].

The Canadian Record of Performance for pure Bred Dairy Cattle. — *Report No. 2, Live Stock Branch, Dept. of Agr.*, Ottawa, p. 49. 526

This is a Report containing the annual official data concerning the milk and butter fat yield of thorough bred cows. It is published every year by the Live Stock Branch of the Department of Agriculture of Canada, under the name, of "The Canadian Record of Performance.„

Canada

The Report contains Regulations concerning the tests, the requisite conditions for the control of the production of each of the different breeds — Ayrshire, Holstein, Jersey, Guernsey, and Franco-Canadian breeds — the necessary formalities, and the list of cows qualified for this control up to March 31st, 1910. The Report in question shows that 1081 cows were submitted to expert examination up to the above-mentioned date, that is: Ayrshires 576, Holsteins 421, Franco-Canadians 58, Jersey 17, and Guernsey 13; of these cows 181 have already been qualified for control, and a large number are still under examination.

In order to be qualified, they must not only produce the requisite quantity of milk and fat in the space of 12 months, during a single lactation, but they must also have a regular calving, that is to say, they must produce a calf within 15 months from the date on which the test begins; also, if the cows are of the age of 4 years and over, the last lactation must not have preceded the trial by more than 15 months.

J. AUBRUNNER. **The Utility of Cover for Milch Cows.** (Zur Rindviehzuchtförderung).—*Wiener Landwirtschaftliche Zeitung*, 6 J., No. 4, pp. 30-31. Wien, 1911. 527

Mr. Aubrunner points out the damage which is done by the raising of horned cattle by a unilateral, forced production, and shows what good results are obtained by having cows covered whilst they are still yielding milk.

Austria

The average results of three series of experiments made near Vienna were as follows:

Number of cows . . .	10	7	3
Day rations per head .	531	542	1007
Milk produced per head:			
1st lactation . . . litres	5999	3524	3032
2nd » . . . »	—	5227	3234
3rd » . . . »	—	—	3139
Total litres	5990	8750	9405

Yield in milk and calves:			
per head . . . . . . fr.	1386	2081	2277
Expenditure per head:			
Fodder . . . . fr.	843	1249	1456
Loss . . . . . . »	58.8	43	32.5
Total fr.	901.8	1291	1488.5
Net receipts per head fr.	484.2	790	788.5

528 **The Milk Industry in the Province of Emilia, Italy.** *Statistique laitière de la province de Reggio Emilia présentée à l'Exposition internationale de Bruxelles de 1910*, p. 16. Reggio Emilia, 1910.

Italy

The province of Reggio Emilia has an area of 229 154 hectares, on 30 000 of which forage crops are grown. In 1909, this province possessed 153 828 head cattle, 50 000 of which were cows producing milk for the cheese industry; in 1910 the milk production reached 950 000 quintals.

The agricultural products of the province are wheat, cattle, milk and grapes.

The milk industry is of very old date and the country has always been renowned for it. The horned cattle raised here are the "reggiana rossa" (red Reggian), which have recently been greatly improved (from the point of view both of meat and milk) by crossing with the Swiss Simmenthal breed (on the plains) and the Schwytz (on the hills). In 1910 there were 745 cheese dairies in the province, 40 of which are cooperative.

The proportion of fat in the Reggio Emilia milk is on an average 4 %: it rarely drops below 3.5, and in autumn often rises to 5. In the manufacture of cheese, the milk from two milkings is left to stand and then partly skimmed (giving an average of from 1.5 to 1,8 kg. of butter per hectolitre of milk), and immediately afterwards it is put into a boiler and heated until it coagulates, which takes place in from 20 to 30 minutes. The coagulated milk is broken up finely and then cooked at a temperature of from 54° to 55° C.

An essential part of the manufacturing process is the adding of a fixed dose of whey-ferment "siero-fermento" from the fermentation of the whey which gave a successful cheese on the previous day. The whey-ferment has a double action; it corrects the acidity of the milk and adds to it a useful proportion of lactic ferments.

When the cheese is made, it is dry salted for 15 or 20 days and kept for three years in the ripening ware-houses. The average yield is 6.8 to 7.2 kg. of cheese per quintal of milk.

STATISTICAL TABLE
OF THE DEVELOPMENT OF THE MILK INDUSTRY
IN THE PROVINCE OF REGGIO EMILIA

Year	Dairies		Milk used	Cheese produced	Butter produced	Pigs raised
	Private	Cooperative				
			qls.	qls.	qls.	
1880.	320	—	176.610	10.637	3.053	5.650
1888.	365	—	245.906	15.242	3.196	7.875
1900.	524	6	689.000	46.852	11.713	22.045
1904.	573	27	800.000	54.400	13 600	25.600
1907.	593	37	882.000	59.976	14.994	28.000
1910.	705	40	950.000	70.000	16.800	31.000

G. Fascetti. **General Practical Instructions for the Manufacture of the "Grana „ Parmesan Cheese of Reggio.** — *Norme pratiche direttive della fabbricazione del grano reggiano,* in-8°, pp. 1-16, Reggio Emilia, 1910. **529**

Italy

The manufacture of the so called "grana „ parmesan cheese of Reggio has made considerable progress since the use of whey ferment (siero fermento) has become general. This ferment is prepared with pure cultures of the two lactic ferments which predominate in the cheese paste when it is successful and it is renewed with the whey from the cheese which has turned ont well the day before. The pure ferments are furnished by the Bacteriological Laboratory of the Royal Dairy School of Reggio Emilia (*R. Scuola di Caseificio di Reggio Emilia*). A part of the whey left by the cheese is heated at 90° C for a quarter of an hour when it has reached about 5 degrees Soxhlet of acidity, It is then allowed to cool rapidly to 45° C, so that the filaments of the buttermilk separate, when the clear liquid is drawn off by a syphon and a mixture of the two selected cultures is added to it. After 20 hours' fermentation at about 30° C, the whey, which then reaches nearly 12° Soxhlet, is in the desired condition for use.

The renewal of the fermented whey is made by withdrawing the quantity of whey desired from the boiler as soon as the cheese is cooked, and putting it into a receptacle (in the form of a truncated cone of the capacity of 25 to 30 litres, 50 cm. in height and 15 cm. in diameter at the opening) with hot water, to which from 0.2 to 0.5 litres of the ferment of the previous day has been added.

The greater the natural acidity of the milk, the smaller the quantity of fermented whey used.

This acidity is not as a rule greater than 0.1 % from autumn to spring in Emilia, and varies from 0.2 to 0.4 % during the summer.

530 Enore Tosi. **Progress of the Milk Industry in the Province of Vicenza, Italy.** (I progressi del caseificio nella provincia di Vicenza). — *Il Caseificio Moderno*, Anno IV, No 3, pp. 40-41, Piacenza, Feb. 1, 1911.

Italy

The milk industry of the province of Vicenza has made remarkable progress of late, especially in the creation of cooperative dairies, of which that of Sandrigo, described in this article, appears to be one of the most important. This Cooperative Dairy, founded on February lst, 1901, by 29 members, had 206 members in 1910, and whilst it disposed of only 1400 quintals of milk in 1901, it dealt with 6200 quintals in 1910. The cheese made at Sandrigo is of the "Asiago „ type (1). The butter, which is greatly appreciated, fetches high prices at Vicenza, but a part of it is kept for the needs of the families of the members.

531 Alberto Varnetti. **Dairying in Argentina.** (L'Industria del latte nell'Argentina). *Il Caseificio Moderno* Year IV, No. 3, p. 37. Piacenza, Feb. 1, 1911.

Argentina

The production of butter and of caseine is increasing every year in Argentina. There is an important exportation of these two products, while 68 °/₀ of the local consumption of cheese is imported. From observations he made in Argentina, Mr. Varnetti found that the main obstacle in the way of cheese-making was the uncertainty of the milk production, due to insufficient irrigation in a country very subject to drought, and with uncertain climate. Another drawback is want of roads and difficult communication between the farms.

The Argentine milch cow is fed solely with fresh lucerne, which gives a slightly aromatic taste to the milk. The present conditions of the cheese industry are not favourable to the employment of competent experts.

532 Ew. Weber. **Investigation into the Milk Production of Cows in Heat.** (Untersuchungen über Milchproduktion brünstiger Kühe). — *Milchwirtschaftliches Zentralblatt*, pp. 1-19, Heft 1-7 Jahrg. Leipzig, 1911.

Germany

The production of milk does not decrease in fact, although it appears to do so, at the rutting period, because the cows retain it. Clever milkers manage to overcome this habit, and the milk production then becomes normal. The quantity of fatty matter does not decrease during this period, and, if there appears to be any decrease, it also is due to incomplete milking. Generally speaking, there is no alteration in the acidity; it is only as an exception that certain cows give a milk in which the proportion of acidity is abnormal and higher.

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(1) A dry local cheese of which two qualities are sold: the cheese of the year and the old cheese of 4 or 5 years back. It is the latter type, which is also called mountain cheese, which is prepared at Sandrigo. [*Ed.*].

The reaction to litmus paper takes place as in ordinary milk. The milk does not coagulate when boiled, except in certain exceptional cases of particularly excitable animals.

It is only in exceptional cases, also, that there is a defective coagulation when the fermentation test is applied. The presence of blood globules is not a specific quality of the milk from cows in this condition.

The presence or absence of leucocytes and colostrum matters in the milk does not change during this period. An alteration in the form and colour of the fat globules of the milk may be produced exceptionally among very excitable cows, and cause a yellower colour. The organoleptic qualities of the milk do not alter at all except in unusual cases.

During the experiments made with milk as food during this period, no inconvenience has been found to result, either in man or in calves or kids.

C. Gorini. **On the Virulence of the Lactic Ferments contained in the Excrements of Milch Cows.** (Ricerche sulla virulenza dei fermenti lattici contenuti nelle dejezioni delle vaccine). — *Rendiconti del Reale Istituto Lombardo di Scienze e Lettere*, Serie II, Vol. XVII, Fasc. XVIII, pp. 777-780, Milano, 1910. **533**

Italy

The microbe content of milk is in strict relation with that of the excrements of milk cows. In practice the fouling of milk by this cause cannot be avoided except by mechanical milking in closed receptacles. It is necessary to study the virulence of the lactic ferments contained in the excrements because, as is well known, the lactic ferments have a function which is antagonistic to the abnormal ferments of milk. The determination of the virulence of these ferments must be based on:

1) the time employed for the coagulation of the milk;
2) the degree of acidity produced;
3) the vital resistance to a high degree of acidity.

The investigations made by Mr. Gorini on some cows of the Stelvio Alps (altitude 2400 m.) enabled him to isolate some breeds of lactic ferments endowed with an absolutely extraordinary energy, which in this particular case constituted a safeguard against the abnormal fermentation of milk in its different uses.

534 F. SPINDLER. **The Catalases of Milk** (1). (Beitrage zur Kenntniss der Milchkatalase). — *Biochemische Zeitschrift*, XXX B., V. H., pp. 384-412. Berlin, Jan. 14, 1911.

Germany

Mr. Spindler recommends for practical use Dr. Lobeck's *Katalaser* apparatus, constructed by the firm of Hugershoff at Leipzig. His experiments with this apparatus have given the following results:

I. The catalase number of a milk, that is to say, the number of cc. of oxygen which are given off from 10 cc. of milk treated by 5 cc. of a 1 % solution of oxygenated water ought not as a rule to be more than 2.5.

II. The fact of this limit being surpassed is an index of physiological or pathological abnormality.

III. Generally speaking, a mixed, old and sour milk has a higher catalase number.

IV. A high catalase content may be simulated by addition of bicarbonate of soda, which should consequently be determined.

V. A milk which is rich in catalases in the fresh state generally gives an alkaline reaction.

VI. Goat's milk generally has a poor catalase content.

535 H. D'ANCHALD. **Payment for Milk in Cheese Dairies.** — *Journal d'Agriculture pratique*, No. 2, p. 50. Paris, Jan. 12, 1911.

United States

Professor Babcock, in the United States, has studied the question of the payment of milk when supplied to co-operative cheese dairies. He proposes that the payment should be made according to the content of caseine and butter-fat in the milk, which should be added together and estimated at the same price. Each farmer would thus be paid the value of his milk from the cheese manufacturing point of view, and also on its butter-value.

The Babcock method thus takes count of the real and special quality of the milk, which plays so important a part in the cheese industry.

536 A. Mc KAY. **Losses from Over-Ripe Milk in Cheese Making.** (O. A. C. Experiments in Cheese Making 1910). — *Farmer's Advocate*, Vol. XLVI, N. 958, p. 180, Feb. 2, 1911. London, Ontario.

Canada

Among a number of experiments carried out at the Dairy Branch of the College of Agriculture, Ontario, in 1910, one series was made for the purpose of determining the losses caused in the manufacture of cheese by the use of over-ripe milk.

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(1) Milk catalase is an oxidising enzym, due very probably to the presence of leucocytes and bacteria. See: LASAR, *Handbuch der Technischen Mykologie*, I. B. § 155, p. 69 and following. [*Ed.*].

The process which served as the basis for these experiments consisted in making cheese one day with over-ripe milk and the next day with ordinary milk, and comparing the results.

There were 12 experiments altogether, for 7 of which 16 413 lbs (1) of over-ripe milk were used, containing 3.46 % of fatty matters and 2.36 % of casein; the loss of fatty matters in the whey was 0.26. 6408 lbs. of ordinary milk was used for the other 5 experiments, with an average percentage of fatty matters and of casein of 3.38 and 2.31 respectively, the loss of fatty matters in the whey being 0.23. The first milk was about 51 minutes in the whey, and the second 2 hours 38 minutes. The average yield in cheese was 88.96 per 1000 lbs. milk for the over-ripe lots, and 91.44 lbs. from the normal. In the first case is took 11.17 lbs. of milk to make 1 lb. of cheese, and in the other case 10.78 lbs.

The quality of the cheese, as shown by the average of the results, was as follows:

	Flavour 40	Closeness 15	Colour 15	Texture 20	Finish 10	Total 100
Ordinary milk. . .	36.2	14.8	14.8	17.8		93.8
Over-ripe milk. . .	35.8	14.2	14.2	17.6		91.7
	0.4	0.6	0.6	0.2	—	2.1

The ordinary milk produced 2.48 lbs. more than the other, although the latter contained more fatty matters and casein.

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(1) English pound = 453 gr.

Importation of Chinese Food Products into England. (Consular Report).— *Feuille d'Informations du Ministère d'Agriculture*, Paris, Jan. 17, 1911. **537**

Great Britain. China

An English official at Hankow has reported upon the excellent hygienic conditions under which pigs are raised in the vast agricultural regions of this part of China, and also upon those under which the food products for exportation are prepared.

The following consignment has just reached Liverpool:

4270 carcases of pigs;
9226 cases of eggs;
1504 » of bacon;
8089 » of wild ducks;
3744 » of wild geese, etc.
3716 » of woodcock;
1883 barrels of refrigerated salmon.

In view of the probable extension of the trade in food products with China, two steamers have been provided with cold storage apparatus, and it is probable that a regular service between China and England will be organised.

538 **The Meat Industry in Russia.** (Britische Teilnahme am russischen Ausfuhrgeschäft). — *Das Handelsmuseum*, Wien, Jan. 26, 1911.

Russia

A Danish and an English Company have set up at Kurgan two large slaughter houses and factories for the preparation of pork. The Russian district where pig-raising is most developed (Tambow-Woronsch), as well as the Vistula region export a large quantity of pigs into England.

In the Vistula region the English have also started a vast export trade in butter and poultry.

539 G. BLANC. **The Glycogen Method and the Examination of Horse Meat in the Products of the Pork Trade.** — *Annales des Falsifications*, année IV, N. 27, pp. 1-3, Paris-Genève, 1911.

France

The fact, observed a long time ago and subsequently confirmed, that the horse-meat steeped in diluted solution of Iodine in potassium iodide gives a much more intense brown colouration to the liquid than that obtained by steeping beef under the same conditions, has led chemists to devise a process on these lines for the differentiation of the two meats. The reaction is due to glycogen; and, kept strictly to this case, the method gives good results. But glycogen only exists in traces in all the dry products that may be manufactured with beef, pork or horse-meat. It is possible that the glycogen remains intact in cooked articles, but the addition of from 0.5 to 1 % of starch to the condiments used makes any investigation practically impossible.

The " glycogen " method is of no value, therefore, for the pork butcher.

540 JADOUL. **Late and Early Pork.** — *Revue Générale Agronomique*, N. 11, Louvain, 1910.

Belgium

There is an economical question in the breeding of pigs: that of the cost price per kilogram of the late meat compared with that of the early meat. Some experiments have been made in this regard on early Suffolk pigs and late German pigs, which showed that the animal of the late breed requires about 4 $^1/_2$ kg. of dry matter for food, while the early breed only requires 3 kg. for a gross increase in weight of 1 kg. The object of fattening pigs is to obtain the meat quickly and at a good price, and the Yorkshire realises this desideratum most satisfactorily. The influence of the Yorkshire is shown in other ways also; the frame becomes more refined, the thickness of the skin and the volume of the bones decreases, and the power of assimiliation is carried to a high degree.

The pig breeder should fatten his pigs in accordance with the taste of his customers. If the animals are to be exported into England, the flesh must be streaked with fat and the weight reduced, and the fattening process must therefore begin early, towards the 3rd or 4th month. The Yorkshire breed answers to these requirements better than any other.

The World's Wool Production and Consumption. — *Questions Diplomatiques et Coloniales*, p. 186. Paris, Feb. 1, 1911. 541

The consumption of wool is increasing in every part of the world, but production does not increase at the same pace.

The average supply of the wool industry during the past 10 years was 1 030 000 tons, and the fact that the amount produced in 1909 alone was 1 174 000 tons means that the industry is better supplied than ever before. The increase has not taken place in Europe, where the production has remained practically stationary, but partly in North America, and particularly in Australia, which had a respective increase of 30 000 and 62 000 tons.

Out of the 1 174 000 tons of wool put on the market, Great Britain took 21 %, the European Continent 53 %, and North America 26 %. France and Germany are the countries which consume the most wool.

A. G. GILBERT. **Warmed *versus* Cold Houses for Egg Production.** — *Experimental Farms Report*, 1910, Dept. of Agr. Ottawa, Canada, pp. 301-203. 542

Canada

Different groups of fowls were kept in houses warmed by stoves, and compared in egg yield with similar groups kept in unheated houses having cotton fronts. This experiment commenced in November 1908, and lasted one year. Three lots were housed in the warmed pens, and one lot in a cotton-fronted, unheated house.

Thirteen white Wyandotte hens two years old, housed in a warmed pen, laid during the year 847 eggs, being an average of 65 eggs per hen. Of these, 25.62 per cent were laid before March 1st.

In warmed pen No. 2, 4 hens and 8 pullets of the Buff Orpington breed laid in the year 498 eggs, an average of 41 1/2 eggs per fowl. Of these, 32.93 per cent were laid before March 1st.

In warmed pen No. 3, 11 white Leghorn pullets laid 722 eggs during the year, an average of 65 1/2 eggs per hen. Of these 32.5 per cent were laid before March 1st.

In the unheated house, 11 hens and 5 pullets were kept. These in the year laid 1208 eggs, an average of $75\,^{1}/_{2}$ eggs per hen. Of these, 21 per cent were laid before March 1st.

It is pointed out that the best layer in the unheated house laid 140 eggs, while the best layer in the heated house laid only 79 eggs.

The rations used were as follows:

Morning and evening: whole grain, composed of equal parts wheat and oats, scattered amongst litter on the floor.

Noon: Ground grain fed dry composed of equal parts of corn, barley, oats and wheat bran.

Until April 1st ground bone was fed every three days, after that date meat scraps were used instead, mixed with the dry noon feed.

Raw vegetables were given every third day during the winter. The birds had constant acccess to gravel and crushed oyster shells.

Note.* — The significance of this experiment will be appreciated, when it is understood that the temperature at Ottawa is very often below zero Fahr, during the winter months and occasionally reaches 20 degrees or more below.

543 **Hatching Chickens by Electricity**. (Report of Poultry Manager). — *Experimental Farm Report*. Ottawa, Canada, 1910.

Canada

Chickens have been hatched successfully twice during the season by means of the heat produced by the electric wires that illuminate the hen houses. The eggs were placed in a small incubator containing 60 eggs, and arranged in such a way as to utilise the electricity as a source of heat. The electricity used was of sufficient power to feed a house lamp of 16 candle-power.

The machine used, known under the name of the "electrobator," was found to be very convenient and easy, and maintained the required temperature of 103° F. (39°.4 C.) with remarkable precision.

The following table gives the results:

Date on which eggs were put in incubator	Description of eggs	Number of chicks hatched %							Remarks
		Incubated	Sound	Containing dead germs	Dead in the shell	Hatched	Out of the total of eggs incubated	Out of the total of eggs fecundated	
1909 May 1.	Light yellow Orpingtons, Striped Plymouth Rocks & wh. Leghorns	62	16	11	9	26	42	$74\,^{1}/_{3}$	The eggs were laid by hens kept in cold hen-houses, with the exception of the white Leghorns.
» » 29	Light yellow Orpingtons, striped Plymouth Rocks & wh. Wyandot.	64	17	4	7	38	$56\,^{1}/_{4}$	$83\,^{3}/_{4}$	

After being hatched, the chicks were placed in a foster mother also heated by electricity, where they developed in the ordinary manner.

The apparatus used for heating the foster mother is called an "electrohover," and in this, as in the preceding case, the heat was maintained with great regularity.

E. PENNINGTON, **Egg Storage. Studies of Poultry from the Farm to the Consumer.**— *U. S. Department of Agriculture, Bureau of Chemistry*, Cic cular N. 64, p. 13, Washington, 1910. **544**

United States

Preserving eggs by cold storage. — Among the various ways of preserving eggs, cold storage is by far the best. By this method the good qualities of the eggs can be preserved for a long time, on condition that they are fresh when put into the cold chamber. The cold, as a matter of fact, does not improve them in any way, and does not prevent further deterioration if it has already commenced. The temperature of the chamber must not be too low, because if the eggs are frozen, even superficially, the result is disastrous.

The value and importance of preserving eggs in cold storage during the period between the laying and their delivery to the consumer is beginning to be recognised in the trade. By adopting the cold storage method, the enormous losses formerly so frequent are now avoided.

The eggs must be put into the storage as soon as they are laid, but it is only the large egg dealers who have the means to carry out this operation. They put the eggs into chambers at a temperature of 3° to 4° C., and pack and send them off in cold storage waggons at this temperature, thus reducing possible losses to a minimum.

In practice the growth of a fine white mould on the eggshell is a good indicator of moisture conditions. This mould does not penetrate the shell; it is snow white, woolly and very delicate; a luxuriance of growth means too much moisture. A lack of it is apt to indicate an undue drying out of the contents of the shell.

Eggs which are laid in spring after the period of frosts appear to be the best for cold storage. Scientific investigations have not yet ascertained whether this superiority is due to the season or to a special physical condition of the hen.

As eggs absorb odours, it is absolutely necessary that they be protected from any bad smells during the cold storage period. If farmers are taught how to manipulate their eggs with care and to sell them promptly, and if refrigeration be used in the packing houses, in transit, and during marketing, good eggs will be obtainable all the year round.

Chemical and bacteriological examination of preserved eggs.—This is practically a new field of study. F. C. Cook (Bulletin 115) has made some observations on 5 lots of eggs preserved for periods varying from 3.5 to 19.6 months. The characteristic "storage" odour was noticed after 12.6 months. The separation of whites and yolks was difficult at the end af 7.5 months, the whites becoming more and more watery.

It was observed that the white and yolk of stored eggs absorb water when boiled; After long boiling, they show on analysis an increase in the lower nitrogen bodies, peptones and proteoses, and the coagulable nitrogenous compounds and amines diminish. There is also a decrease of lecithin phoshorus at the end of 3.5 months.

Howard and Read (Bull. 115) have observed characteristic rosette crystals in the yolks of eggs stored 12.6 months. The composition of the crystals was not determined.

The bacteriological examination of preserved eggs has been made by Stiles, who found numerous organisms of different species in the eggs at the end of 3 months. The number decreased afterwards up to 20 months at which period the specimens were sterile.

As a preliminary to his studies on the effects of handling on the quality of eggs, Mr. Pennington has studied the chemical and bacterial content of fresh eggs and has determined the species of organisms found in the eggs.

545 **Sericulture in European Turkey.** (La sericultura nella Turchia Europea). — *Bollettino di Sericultura.* Milano, 28 gennaio 1910.

Turkey in Europe

The Government has established an Institute of Sericulture under the supervision of the Administration of the Turkish Public Debt, which superintends the production of the silkworms' eggs and concerns itself with the theoretical and practical teaching of the best methods of silkworm breeding and silk spinning. Special inspectors are appointed to inspect breeding premises.

The State distributes 250 000 mulberry plants from its nurseries every year, in the districts of Adrianople, Salonica, etc. It organises competitions for the best mulberry trees, keeps a close supervision on the quality of silkworm seeds, and has instituted a model spinning mill at Groengheli.

546 ENNEMOND MOREL. **Sericulture in Turkestan.** — *Compte-Rendu des travaux de la Chambre de Commerce de Lyon,* Année 1909, pp. 403-404. Lyon 1910.

Turkestan

Two species of mulberry trees grow in Central Asia, one black, the other white. In every part where the climate is suitable the natives breed silkworms; each family generally breeds 2 to 3 *zolotnicks* of seed, sometimes 10, rarely more (1 zolotnick = 4 gr. 265).

Before the Russian occupation the natives bred local species of silkworms, the best of which was the *Vandarsi,* of Bokhara and Khiva. From 1870 to 1881, the pebrine disease ravaged the stocks. In 1885 the Government founded a first sericulture Station at Taschkend with the object of distributing bacteriologically pure seeds gratuitously. This system having given good results, other Stations have been instituted at Margheban, Samarkand, Petro Alexandrowski and Askabad.

After the opening of the Transcaspian railway the exportation to Europe developed rapidly. The production of cocoons in Turkestan was worth 11 200 000 fr. in 1908, and in addition to this exportation a large quantity of cocoons were spun in the country, the amount, however, being unknown. There are no spinning mills for silk in Turkestan, silk spinning being a home industry.

No further development of silkworm breeding at Ferghana and in the province of Samarkand is to be expected until new plantations are made, but the exportation from Bokhara is certain to go on increasing.

Part of the cocoons are still stifled by the primitive system, which consists in exposing the cocoons to the sun, but the stifling by steam is being adopted more and more every day.

LAFONT. **On the Production of Silkworms' Eggs in Persia.** — *Le Moniteur des Soies*, No. 2519. Lyon, Janv. 7, 1911. **547**

Persia

Although Persia had formerly a great export of silkworms' eggs it has not produced eggs for the last 40 years. The 350 000 boxes, (each containing 1 ounce = 25 grams of eggs), required by the country are nearly all imported from Turkey. Those who are against the production of eggs in Persia state that reproduction from the cocoons gathered in the low and damp plains of Ghilan and Mazanderan give very feeble products. It is certain that better results would be obtained by reproduction in drier and more mountainous countries, but it should not be forgotten so quickly that the eggs produced in Persia, especially in the plains on the Caspian shore, gave quite as good results as the Turkish eggs which are now imported.

There can be no doubt as to the success of the eggs prepared in Persia by the Pasteur methods. Mr. Lafont himself prepared some eggs at Retch and Enzéli with the cocoons of the country, and obtained 42 kg. of excellent cocoons per ounce of eggs, whereas the Turkish eggs, hatched in the same place and under identical conditions, gave only 40 kg.

Another small lot of the same eggs gave 70 kg. of cocoons to the ounce.

LAMBERT. **Oak Silkworms.** — *Le Moniteur des Soies*, p. 4. Lyon, Fév. 4, 1911. **548**

China.
India.
Japan.
Europe

There are three species of oak silkworms, which feed on the leaves of the oak: the silkworm of the Indian oak, or "mylitta" worm (*Bombyx* *mylitta*), the silkworm of the Chinese oak (*Bombyx pernyi*) and the silkworm of the Japanese oak (*Bombyx yama-maï*). The *mylitta* lives on several other species of plants, as well as on the oak. It is possible to breed the last two kinds of oak silkworms in Europe with comparative ease, but not the first. There are other wild silkworms which can be cultivated in European countries, among them being the silkworm of the Chinese ailanthus (*Bombyx cynthia*), the silkworm of the castor oil plant of India (*Bombyx arrindia* or *ricini*) and the silkworm of the plum tree (*Bombyx cecropia*) of North America.

The cocoons of these three species are open at one of the extremities, and therefore cannot be spun, or only with great difficulty, for industrial purposes.

The production of wild cocoons is very limited in proportion to that of the mulberry cocoons; it scarcely reaches 35 million kg. at the present time. Out of this total weight, 22 millions are produced by the *Bombyx pernyi* and 180 000 kg. by the *yama-maï*.

The total yield of silk-cocoons is about 400 million kg. yearly, the production of wild cocoons being barely a tenth of this amount. The latter is therefore a very secondary production in comparison with that of the mulberry silkworms. The silk from the Japanese *yama-maï*, is not exported to Europe, as it is all required for the home demand.

549 TURQUET. **Commercial Utilisation of the Wild Silks of Central Africa.** — *Bulletin des Soies et des Soieries*, p. 3. Lyon, Fév. 11, 1911.

Central Africa

The silk-cocoons which are found in abundance in the forests of Central Africa are like large brown pouches, constructed by colonies of vast numbers of caterpillars. The silk cannot be reeled off, but forms a silk floss which is very useful as raw material.

There are also small white cocoons, woven by a single worm like those of the mulberry *Bombyx*, which give a very fine and brilliant thread. But the commercial future of this industry would seem to depend mainly on the big silken pouches which are carded and then spun, and a Company has been formed in Berlin for the purpose of dealing with these big cocoons, of which the natives make no use.

550 J. C. OAKENFULL. **Bee Culture in Brazil.** — *Brazil in 1910*, pp. 173-174. Devonport, England, 1910.

Brazil

The honey bee, as known in Europe, is not native to any part of America.

There are, however, some honey producing bees common to Brazil, and in particular one stingless variety. The only apiculture practised in Brazil is with the bees introduced from Europe, and a large quantity of honey is produced in most of the States, especially in Rio de Janeiro. The largest colony is at Campos, and owes its origin to Italian bees imported in 1904; the honey is of excellent quality. This culture is also carried out on a small scale in many parts of Saõ Paulo, and planters of vanilla are advised to keep bees in order to artificially fertilise the female flowers.

In Parana, where use is made of the most modern apparatus, each hive yields from 25 to 30 kg. of honey, and from 1 to 2 kg. of wax per annum.

Contagious Diseases which attack the Brood of the Honey Bee. — *American Grocer*, p. 12. New York, Dec. 21, 1910. **551**

According to the statistics of the United States Department of Agriculture, at least 20 million dollars' worth of honey is produced by the honey bee every year, and this amount could be greatly increased. The most serious drawback is that the brood is liable to certain contagious diseases. Two of these have been distinguished: *American Foul Brood*, and *European Foul Brood*. **United States**

It is calculated that the total loss caused to bee keepers in the United States by these diseases is at least a million dollars, or 5 million francs a year. This estimate is based on the probable value of the swarms which die, and on the probable loss of production due to the weakened condition of diseased swarms. The States where these diseases are particularly prevalent are California, Colorado, Illinois, Indiana, Iowa, Kansas, Michigan, Missouri, Nebraska, New Jersey, New York, Ohio, Pennsylvania, Texas and Wisconsin. In these States honey production is most profitable.

KERZ. **The Protection of Birds.** (Vogelschutz). — *Geisenheimer Mitteilungen über Obst- und Gartenbau*, No. 1, pp. 12-13, 2 figs. Wiesbaden, Januar 1911. **552**

Mr. Kerz insists on the necessity of providing food reserves for birds, not only at periods when hoar frost or snow prevents the birds from finding their food by themselves, but also at other periods, so that the birds may get to know the places and the apparatus where food is to be found. **Germany**

He describes one of these apparatus, which is intended especially for the tomtit. It is in the form of a small quadrangular box suspended to the trees; there is a longitudinal slit in it through which the birds take their nourishment, and there is also a special device to prevent sparrows from eating out of these boxes.

The food is covered by a double iron wire grating, the interstices in which are so small that the beak of the sparrow cannot pass through them, whereas the long and slender beak of the tomtit passes through easily.

553 M. Matunok. **The Protection of Birds taught to Children in Hungary.** (Der Vogelschutz als Lehrgegenstand in der Elementarschule).—*Aquila-Zeitschrift für Ornithologie*, Tom. XVII, p. 236. Budapest, 1910.

Hungary For about two years past the teachers in the parish of Bregnòbàyne have been giving their scholars courses on the protection of birds. The good results of this initiative were soon shown by the remarkable increase of useful passeridae.

554 **State Promotion of Fishing in Hungary.** (Die Staatliche Förderung des Fischzuchtbetrtebes in Ungarn). — *Oesterreichische Fischerei-Zeitung.* Wien, Jan 15, 1911.

Hungary In an order dated 13 Nov. 1910 the Hungarian Minister of Agriculture, Serényi, points out the great importance which the development of the fish industry has for Hungary, as it is one of the best means of counteracting the increasing price of food. Up to the present, Hungary has imported a large proportion of her river and pond fish from abroad. The State ought now to intervene and assist private enterprise, either by reimbursing the capital employed, or by supplying gratuitously from 50 to 100 % of all the needful apparatus for some years. There are at present 7491 hectares or 18 502.77 acres given up to fish culture in Hungary, and the supply of fish per year is worth 2 million crowns, or about £85 000. Taking the present yearly yield as the basis it would appear that Hungary could easily supply a quintal of fish annually per joch (5754 sq. met.) of water area.

555 Losada. **The Rumanian Fisheries.** — *Memorias Diplomaticas y Consulares*, No. 263, pp. 17-18. Madrid, 1910.

Rumania In Rumania, more than 800 000 hectares are covered by rivers, lagoons, lakes, marshes and ponds. The Rumanian fisheries are the most important in Europe after those of the Volga. Since the passing of a fisheries law, a few years ago the quality and quantity of the fish have much improved. The State possesses 450 000 hectares of fisheries of which it controls 387 000 hectares, the remainder being let out to companies and private persons. From 16 to 18 million kg. of fish are annually taken from the State fisheries. The chief markets are Braila, Galatz, Tulcea and Constanza. Russia, Austria-Hungary and Bulgaria are the chief importers. The fish is exported fresh, the salt fish industry being still in its infancy in Rumania.

556 CALVET and PAUL. **Contribution to the Study on the "Greenness" of Oysters.** — *Annales de Médecine Vétérinaire*, 60^e année No. 2, pp. 105-106. Bruxelles, Fév. 1911.

France. Belgium

Certain oysters, such as those of Marennes, (France), and Ostend (Belgium), which are green in colour, are much sought after because they are plump, very tender, and have a special astringent, spicy flavour. The colour is exclusively due to the absorption of a Diatom *Navicula ostrearia*.

There is another natural and physiological greenness, which characterises the oysters of the Falmouth and Truro waters. The change of hue in this case is due to the large amount of copper in solution in the water. The oysters have such a metallic taste, that there is no fear of their poisonous qualities being overlooked. The greenness in this case affects all parts of the oyster.

This latter fact gave rise to a fraud, consisting in the immersion of oysters in a bath of sulphate of copper, with the object of passing off these artificially green oysters on the market as the natural products of Marennes and Ostend.

Agricultural Industries.

557 G. FILAUDEAU. **The Wines of the South of France in 1910. The Aude Wines.** — *Annales des Falsifications*, Année IV, No. 27, pp. 12-20. Paris, Jan. 1911.

France: Aude

That which marked the vine industry in the Department of the Aude in 1910 was the great variety of the products. Just as in one and the same region the yields varied from single to quadruple, so the products of one vineyard often showed great differences in the quality and composition. If it were possible to give a general estimate, it might be said that the proportion of low grade wines was not very exaggerated. These wines also had a slight excess of acidity which helped to disguise their inferiority. As to the rest of the production, the percentage of alcohol was generally less than in ordinary years, and in the wines of the Aude, as in all the wines of the South of France in 1910, there was a strong proportion of tartaric acid.

Mr. Filaudeau came to these conclusions after examining a very large number of samples of wine from the four great districts of the Department, namely, Narbonne, Carcassonne, Limousin and Corbières; and they are attested by a number of tables which give the maximum, minimum and average of alcoholic strength, and the total acidity (calculated as sulphuric acid) in the principal wines.

558 Pablo Diez. **On the Ratio of Alcohol to Extract in the White Wines of Andalusia.** — *Annales des Falsifications*, IV année, n. 27, pp. 20-23. Paris-Geneva, Janv. 1911.

Spain: Andalusia

A table giving the results of 64 analyses made from 1889 to 1910, furnishes some useful information on the average composition of the natural white wines of Andalusia. The ratio of alcohol to extract is, in three cases out of four, more than 6.5 which, by the terms of the Decree of April 19th, 1908, is sufficient in France to establish a presumption of the addition of alcohol.

The following are the minima and maxima according to the table:

	Maximum	Minimum
Density at + 15°C. . . .	0.9803	0.9929
Alcohol % in volume . . .	10°.2	15°.95
Acidity as sulphric acid . .	2.23	3.82
Alcohol + acid	12.55	16.32 (1)
Dry extract at 100° . . .	12.95	35.85
Sulphate of potassium . .	0.37	5.661
Reducing sugar	0.86	9.09
Chlorides, as chlorine . . .	Traces	0.18
Extract, by drying at 100° .	11.36	25.76
Ratio of Alcohol to extract. .	4.50	8.66 (2)

559 Omeis. **Decrease of Acidity in the Natural or Sweet Wines of the Palatinate and Franconia, Germany.** (Vergleichende Versuche ueber den Säurerückgang in ungezuckerten und gezuckerten Weinen des Jahrgangs 1908 aus dem Weinbaugebeit Franken und Rheinpfalz). — *Deutsche Wein-Zeitung*, 48 Jahrgang, No. 8, pp. 68-40. Mainz, Jan. 28, 1911.

Germany: Palatinate Franconia

Mr. Omeis has made a comparative study of the decrease of acidity in the wines of the 1908 vintage, in so far as they have or have not been sweetened.

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(1) The total alcohol (in weight, per cent) + acid per mille is considered an approximate constant characteristic of each quality of wine.

(2) The ratio of the alcohol in weight to percentage of extract is also an approximate constant characteristic of each quality of wine. [*Ed.*].

The results of the analyses may be summed up as follows:

1) In all the wines there was a strong decrease in acidity, which reached its maximum in the wines which had been sweetened. In the white wines, the original acidity dropped from 13.8 ‰ (proportion verified in the must) to 6.7 ‰, and in the wine made from red Portuguese grapes from 13.2 ‰ to 5.4 ‰;

2) Side by side with the decrease of the total acidity and the extract, there was an increase in the proportion of lactic acid;

3) The decrease of acidity in the white wines took place immediately after the first fermentation; and in all the tests in question, it was complete six weeks after this fermentation;

4) The sweetening and watering of the must had no effect at all on the decrease in acidity.

M. Kipper. **The "Terrano" Wine of the Karst, Austria.** (Charakteristische Weine des Küstenland. I. Der Karster "Terrano"). — *Zeitschhift für das Landwirtschaftliche Versuchswesvn in Oesterreich*, XIII, Jahrg., Heft 12, pp. 966-995, Wien, Dec. 1910. **560**

Austria: Litoral of Trieste

This is a chemico-bromatological study of the "Terrano" wine of Karst. The principal conclusions are:

1) The wine production of the Austrian littoral, especially in the territory of Gorizia and Gradisca, is celebrated from ancient times, both from the point of view of quality and quantity.

2) At the beginning of the XIXth century, the importance of this cultivation decreased, mainly in consequence of the various diseases of the vine.

3) In any case, one of the most interesting of these wines is the wine called "Terrano" of Karst.

4) In the Karst there is no "Terrano" vine properly so-called The "Refosco" vines which are cultivated in Friuli, Karst and Istria, and include two varieties, are in every way similar to those which produce the "Terrano" wine.

5) The kind of wine produced in either case depends on geological and climatic conditions, as well as on the different methods of preparation.

6) The "red soil" (*terra rossa*) of the Karst where the Refosco vines are cultivated, which produce the "Terrano" wine, are deficient in phosphoric acid and potash, so that in order that the crop may ripen thoroughly it is necessary that phosphatic and potassic fertilisers should be used.

7) The "Terrano" is a red wine, characterised by the presence of lactic acid (minimum 24.8 %, maximum 51.2 % of the volatile acidity, the total acidity being 8.80 to 9.75 g. per litre).

8) This light acidity and the pleasant flavour, as well as the carbonic

acid contained in the "Terrano," is produced by the decomposition of malic acid, determined by the bacteria in the must and new wine.

9) The physiological properties of the lactic acid are the real cause of the therapeutic qualities attributed to the "Terrano."

10) The traditional method used by the peasants of Karst in the preparation of the "Terrano" offers the best conditions, as a matter of fact, for bringing about the above mentioned bacteriological decomposition.

11) The "Terrano" is the first example of wine prepared by utilising the decomposition of malic into lactic acid, caused by the *Micrococcus malolacticus* bacteria, discovered by W. Seifert.

561 C. MENSIO. **Sparkling Muscatel.** (Il moscato spumante). — *Stazioni sperimentali agrarie italiane*, fasc. XI-XII, pp. 797-916, Modena, 1910.

Italy

After showing that the slow and inactive fermentation produced in the muscatel wines is due to insufficient nitrogenous substances, and that the suppression of these substances is artificially obtained by numerous filtrations, clarifications, etc., which eliminate the ferments, M. Mensio examines the chemical composition and the fermentation process in 10 partially fermented musts and 4 musts of different origin, with and without the addition of nitrogenous substances of mineral salts, etc. The nitrogenous substance used was carbonate of ammonia. He came to the conclusion that the lack of nitrogenous substances is the sole preventive of the active fermentation, and that the addition of carbonate of ammonia is sufficient to set the fermentation going vigorously. In no case was the addition of mineral substances alone sufficient to promote fermentation; on the contrary, it retarded it, even in the presence of carbonate of ammonia. The ferments contained in the muscatels are good alcohol producers and there is a sufficient quantity of mineral substances in the must.

In the second part of his work, M. Mensio shows that it is possible, by adding a high dose of ferments to the must and then eliminating them, to obtain incompletely fermented musts in which the fermentation is produced slowly as in the muscatels. By this process, as a matter of fact, the assimilable nitrogenous substances contained in a must can be taken away in a few hours, and a very slowly fermenting liquid obtained. Experiments have shown that the muscatel must, which has not been treated in any way, may ferment completely, because it naturally contains a sufficient quantity of nitrogen and nutritive matters; but the wine obtained in this case is always defective in taste.

In the third part the writer gives the results obtained by operating with musts put in sealed bottles. The first series of bottles contained the must of muscatel without any addition, and was used as control; carbonate of ammonia in the proportion of 100 gr. of nitrogen per litre was added to the second series, and 100 gr. of nitrogen in the form of peptones was added to the third. In the control bottles, the pressure reached 5 atmospheres, while in the others the fermentation was much more vigorous and all the bottles burst.

The quantity of nitrogen which remains in the wine at the time it is put into the bottle is therefore the most important factor for regulating the pace of the fermentation of muscatels; this quantity varies very much from year to year.

Action of the Ultra Violet Rays on Fermenting Wines. — *Revue Scientifique.* Paris, Jan. 28, 1911. 562

France

Messrs. Maurain and Marcollier found, as will be remembered, that in order to sterilise cider, it must be submitted to ultra-violet rays for 8 minutes if the liquid is only $^1/_4$ of a millimetre deep, and for a quarter of an hour if the depth is 1 millimetre. They afterwards made some similar investigations in regard to a white wine which had already become sparkling.

The lamp was placed at a distance of 4 centimetres from the quartz plate on which the wine was placed, and under these conditions it never required less than 5 seconds or more than 10 to insure the complete destruction of the wine ferment when spread in a layer $^1/_4$ of a millimetre deep. When the wine was 1 millimetre deep the same result was obtained after exposures of from 30 seconds to 1 minute. It was impossible not to be struck with the considerable difference in the length of exposure necessary to obtain the same result with wine and with cider. The writers explain this by the greater transparency of wine to the active rays.

DE GUILLEN GARCIA. **Treatment of White Wines by Cold.** (Aplicacion del frio à los vinos biancos). — *Rivista de San Isidoro.* Barcellona, 5 de Enero de 1911. 563

Spain

In the vinification of white wine it is best to use refrigeration instead of sulphurous anhydride, which leaves a slight smell of sulphur. In addition to preventing refermentation, refrigeration is favourable to the slow process of natural clarifying. The only inconvenience of the process is its high cost.

L. Sterne has constructed at Glasgow an apparatur for the application of the process. The must, separated from the pomace, is cooled to + 2 or 3 degrees C. It is next allowed to stand and then decanted from the deposit. It is left to stand for another day, and then decanted again, after which, the must, thus purified, continues its fermentation after reaching normal temperature.

564 **Operations of an Important French Sugar Mill in 1910.** — *Revue Scientifique*, No. 4. Paris, Janv. 28, 1911.

France

The following figures refer to one of the most important French sugar mills. These model works produce 260 tons of sugar per day,treating 30 000 hectolitres of juice from 13 shredders. The quantity of coal burned daily is 210 tons, and 40 000 tons of calca-reous material per season are used in the liming and carbonisation processes. The electrical energy used for the motors is produced by steam. The heating surface of the 27 steam generators is 5000 square metres. The central chimney is 60 metres high.

565 Bonn. **The Determination of the Primitive Density of Beers.**—*Annales des Falsifications*, Année IV, No. 27, pp. 23-26. Paris-Genève, Janv. 1911.

France

Mr. Paul Deprax publishes an article in the *Brasseur Français* in which he proposes to replace the co-efficient of 1.9 by which the weight of alcohol is multiplied to obtain the weight of the sugar that has disappeared by fermentation, by the co-efficient 2.3.

Mr. Bonn, who has been studying this question for a long time, points out that there are two official tables in France which lead to two totally different results from the point of view of the administrative and penal consequences.

In his opinion, the use of the table attached to the Order of the Minister of Finance on January 24th, 1901 ought to be suppressed in all official laboratories, and a series of experiments should be carried out in order to find an exact solution to the question.

566 A. J. Brown and G. B. Ward. **Valuation of the Antiseptic Properties of Hops.** — *Journal of the Institute of Brewing*, Vol. XVI, No. 7, pp. 641-656. London, Dec. 1910.

Great Britain: England

The keeping quality of beer depends mainly on the antiseptic properties of the hops. Every brewer will admit that the antiseptic or "keeping" properties of hops vary greatly with their growth, quality and age; at present however there is no available means, even approximate, of gauging the relative value of hops with regard to their antiseptic properties. In this study there is a proposal to make a step towards the establishment of a permanent method of fixing this valuation.

During an investigation of the micro-organisms present in a sample of acid beer, one of the writers of this article isolated a long rodlike bacterium which possesses a very great power of multiplication when cultivated in a suitable liquid medium, and is extremely susceptible to the toxic action of the hop extract. As this microbe, called *Bact. X*, may be used with advantage in the comparative measurement of the antiseptic properties of different hops, a large number of experiments were undertaken for this purpose, with the following results:

The antiseptic effect of 1.2 cc. of the extract obtained with samples of Oregon hops (1908) of an average quality, was equal to that of 3 cubic centimetres of Mid-Kent hops (1908) extract. These results were confirmed by the Oregon and Mid-Kent hops of 1909. Other experiments carried out with hops of different growths, quality and age, led to an appreciation of these hops that was very close to that given by the ordinary empirical methods. It was the same with the British Columbia, Marzell and East Kent Goldings hops, as well as with the Bavarian hops of 1909, of an inferior quality, and the "old olds" of East Kent.

This series of experiments, which is extremely interesting on account of the practical effects which may result from it, does not, however, yet offer to brewers a sure method for the valuation of the keeping properties of the hops which they use.

A. Mertus. **Preservation of Hops.**—*La Revue Générale du Froid*, 3° Année, t. III, No. 1, pp. 23-26, + 2 fig. Paris, Janv. 1911. **567**

The best way of keeping hops is to store them in moderately flat compartments in rooms at a constant temperature of from 0° to 3° C., the perfectly dry atmosphere of which is frequently renewed.

France

The alteration in hops is due to direct oxidation by the air, or to the development of certain microorganisms and to enzym actions. Numerous experiments have shown that preservation by cold considerably delays certain changes of a chemical nature, which accompany the maturing of the hop. One of the most characteristic of these is the transformation of the soft resins into hard ones.

The preservation of hops by cold gives excellent results when they can be used immediately on being taken from cold storage.

A. Ch. Girard. **Residuary Waters from Starch Factories.** — *Bulletin des Séances de la Société Nationale d'Agriculture de France*, No. 10, pp. 875-880. Paris, Déc. 1910. **568**

The refuse water from starch factories is always charged with mineral matters and particularly instable organic matters, which give rise to rapid putrid fermentations with production of ammonia, sulphides, butyric acid, etc. They poison the atmosphere, and pollute the water courses to such an extent that they often kill the fish.

France

On the other hand, the treatment for the extraction of starch causes the loss of about $^4/_5$ of the nitrogenous and mineral contents of the potatoes, that is to say, for 1000 kg. of potatoes, about of 4.30 fr. of nitrogen, 0.30 fr. of phosphoric acid, 1.80 fr. of potash, or a total of 6.40 fr. of fertilising matters. Mr. Girard estimates that fertilising substances corresponding to 140 000 quintals of nitrate of sodium, 40 000 quintals of superphosphates, and 72 000 quintals of cloride of potassium are thrown away in the residues from the French starch factories.

In consequence of this calculation, Mr. Girard proposes the extraction of the juice from potatoes before exhausting them through the sieve. This juice contains, on an average, 3.5 kg. of nitrogen, 1.2 kg. of phosphoric acid, and 6.5 kg of potash per cubic metre, representing a value of more than 8 francs. In order to obtain 100 kg. of a product containing 76 °/₀ of organic matters and 24 °/₀ of mineral matters, 7 °/₀ of which is nitrogen, 2.4 °/₀ phosphoric acid and 13 °/₀ potash, of the manure value of 15 to 16 francs per quintal, it is necessary to evaporate 1900 kg. of water, which means only a small outlay on coal.

The manure obtained in this way is very active; all its mineral elements are soluble, and the nitrogen in the albuminoid and amide state is very rapidly nitrifiable.

The manufacture of this manure is also advantageous on hygienic grounds as it completely suppresses an important cause of the pollution of water courses and of the atmosphere.

569 C. E. Saunders. **The Artiticial Bleaching of Flour.** — *Experimental Farms Report*, pp. 169-170. Ottawa, Canada, 1910.

Experiments have been undertaken for the purpose of determining the effects of bleaching on the bread-making qualities of flour.

Canada

The artificial bleaching method usually employed operates by peroxide of nitrogen produced by the decomposition of nitric acid, or more frequently by submitting air to the action of the electric spark, which causes a combination between very small quantities of nitrogen and oxygen of the air. The air thus treated, containing a small proportion of peroxide of nitrogen, is passed into a cylinder which rotates to keep the flour in continual motion. The flour is submitted to the action of this air for about 15 seconds, but the bleaching is practically instantaneous.

Six lots of flour were treated: a flour of superior quality from a spring wheat of Manitoba, a delicate flour from an Ontario winter wheat, and four samples produced at the experimental mill from different types of spring wheat. After the samples had been kept for about three weeks under the usual laboratory conditions, samples of bread were made several times from the bleached and unbleached flours.

There was no difference between the bleached and the unbleached samples, with the exception that the colour of the bleached samples was less yellow in both the flour and the bread. In some cases the bleached flour seemed to be slightly superior for bread-making, and in other cases inferior, but these were minimum differences which are within the limits of the inevitable experimental error. It is certain that the artificial bleaching, although it gives a paler tint to the flour, similar to that produced by natural bleaching, does not make the flour so suitable for bread-making as when it has been kept for a long time under good conditions. On the other hand, it is equally clear that artificial bleaching, suitably obtained as in these experiments, does not noticeably decrease the bread-making qualities of the flour. The bleaching, as far as it has been possible to ascertain, has no effect on the taste of the bread.

C. Grimme. **Characteristics of Certain Little-known Vegetable Oils.** — *The Analyst*, pp. 536-537, Vol. XXXV. London, Dec. 1910. Original in *Chem. Rev. Fett- u. Harz-Ind.*, No. 17, pp. 233-237, 1910. **570**

Germany

The oils and fats, the values of which are given in a special analytical table, were derived from the fruits of the following plants:

1) *Oenocarpus Bataua*, Mart. (1) belonging to the palm family, and producing seeds which yielded 34.8 per cent of a light yellow semi-drying oil, known as *Common oil.*

2) A species of *Attalea* (2) found in America, from the mouth of Rio de la Plata to Honduras. The seeds yielded 52.9 per cent of a solid white crystalline fat.

3) *Virola venezuelensis*, Aubl. (3) belonging to the family of the *Myristicaceae* growing in Venezuela. The kernels of the seeds contained 74.7 per cent of a yellowish-brown crystalline fat.

4) *Virola guatemalensis*, Warb. (4) belonging to the same family as No. 3. The kernels of the seeds yielded 60.7 per cent of a brown crystalline fat.

5) *Pongamia glabra*, Vent. (4) a leguminous plant found in India, South China, and North Australia. The kernels of the seeds yielded 34.75 per cent of a dark yellow butter-like fat.

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(1) *Oenocarpus*, a genus belonging to *Palmae*. Spec. *Bataua*, Mart.

(2) *Attalea*, a palm tree belonging to the *Ceroxyleae*, characterised by a drupe with perforated stone. (Ph. van Tieghem, *Eléments de Botanique*, II, p. 302).

(3) Another well known tree of the family of Myristicaceae is the *Virola sebifera*, Aubl. It grows abundantly in Guiana where it is called *Yayamadon*, *Onorouchi Guingamadon*. It is the « *Muscadier à suif* » The seeds contain a fat used in the manufacture of candles and of perfumed soaps. (Dujardin-Beaumetz and E. Égasse, *Plantes médicinales*, p. 773. Paris, Octave Doin, Edit.).

(4) *Pongamia glabra* belongs to the *Dalbergieae* (*Leguminosae*). In India the oil extracted from the seed is called *pongarmia* or *Kurung* oil and is used by the natives against scabies. (Dujardin-Beaumetz and E. Égasse, op. cit., p. 559).

6) *Irvingia gabonensis*, Baill. (1) a West African tree, the seeds of which produce a white crystalline fat—« Dika butter ».

571 Mingioli. **Extraction of Olive Oil by the Acapulco System.** — *Bulletin de l'Office du Governement général de l'Algérie*, No. 2, p. 37. Paris, Fév. 1, 1911.

Spain. Italy

Among the new methods proposed for extraction of olive oil, the attention of specialists has been most drawn to the Spanish system, Acapulco. Some encouraging results were obtained at Seville in 1908. Mr. Mingioli, professor at Portici, Italy, has tried the method, and gives the following report of it. The plant consists of:

1) an apparatus for washing and elevating the raw material;
2) an apparatus for taking the stones out of the fruit;
3) a pulp elevator for charging the extractors;
4) filtering extractors;
5) collector aspirators for collecting the product.

The apparatus are all connected by a network of tubes, which conduct the steam and receive and carry off the liquids.

The olives are washed by a current of water and are slowly raised by the endless screw elevator into the hopper that feeds the pulpifier. A sufficient quantity of fruit for one charge is dropped into the pulping apparatus, and the machine is set going. The operation lasts 6 or 7 minutes, the noise made by the stones as they knock against the internal walls of the counter-beaters of the cylinder indicating when it is finished. When all the stones are freed from pulp, they are let down into the stone washer, the pulp being raised in the extractor as fast as it is separated. It is very important that no stones should be carried up with it, as they would break the nickel web which is part of the mechanism.

Several modifications have been made in the Acapulco pulp-reducer used at Portici.

The pulp is raised to the filtering extractors, where suction and consequent atmospheric pressure act on the different strata separating the liquid part. The first liquid is the oil, which is separated in a pure and limpid state during the whole time that the cold extraction lasts.

The oil collected in the receptacles under the extractor is carried straight into the vessels or apparatus used for its purification and refinement.

The system offers the following advantages:

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(1) *Irvingia gabonensis*, H. Bn. belongs to the family of *Rutaceae*. It is a large tree, from 8 to 10 metres in height, well known on the West African Coast, especially at Gabon. The crushed seed yields fat known as « Dika butter » largely exported to Europe. (Dujardin-Beaumetz and E. Égasse, op. cit., p. 242). [*Ed.*].

1) the possible transformation of the rural oil industry into a great industrial organisation;

2) economy of space, plant and labour;

3) suppression of the baskets (*scouffins*) and consequent saving of the oil adhering to them;

4) uniformity of certain qualities of the product;

5) possibility of avoiding the alteration of the raw material by long conservation;

6) a better cold extraction is obtained, and the hot treatment gives a much better yield than that obtained by the use of the hydraulic press;

7) the limpidity of the recently extracted oils;

8) slight colouration of the oil.

A. Kesava-Menon. **Some Indian Oils and Fats.** — *Journal of the Society of Chemical Industry*, vol. XXIX, No. 24, pp. 1428-1432. London, December 31, 1910. **572**

British India

These are some data on the production and chemical characteristics of « Ghi », the melted and clarified buffalo butter which is prepared and imported in large quantities in India.

Examination of the guaranteed seeds has furnished some precise data on the fats which, under the names of « Illupi » or « Ellupai », « Mowa », « Mowrah », are extracted, in India, from various species of the *Sapotaceae* family. This production is daily acquiring more importance in the export trade.

	Average weight of a seed grams.	Envelope %	Total fat that may be extracted from the seeds %
Bassia butyracea . . .	1.00	32.52	46.51
» *latifolia* . . .	2.00	29.07	33.87
» *longifolia* . . .	1.40	25.54	39.52
Payena oleifera . . .	0.64	28.05	41.68

A variety of *Bassia longifolia*, *B. malabarica*, acts in much the same way as the *B. longifolia*. The fat of the *B. butyracea* is used as food, the others as well as their oil cakes, which have poisonous properties serving different purposes.

The writer then describes some oils that are extracted from the seeds of the *Jatropha glandulifera*, *Luffa acutangula*, *Mimusops Elengi*, *Pithecolobium dulce*, *Psoralea corylifolia*, *Sapindus trifoliatus*, *Thespesia populnea*, *Vernonia anthelmintica*, to which medicinal properties are attributed.

573 **Manufacture of Cotton-Seed Oil and Oil Cake in Perghana.** — *L'Engrais*, N. 2, p. 44. Lille, Janv. 13, 1911.

Russian Empire: Turkestan

The manufacture of cotton-seed oil has greatly increased during the past two years in the Russian possessions in Central Asia, and now forms an important branch of local industry.

The oil factories are chiefly situated in the province of Ferghana, and the district of Khadjentski in the province of Samarkand. There are only three oil works in other regions. The concentration of the manufacture in Ferghana is explained by the superior quality and abundance of the cotton-seed in this district.

It is announced that the cotton-seed crop for Ferghana this year, will be larger than usual, being about 14 million *puds* (1 pud = 16.381 kg.).

574 **The Cigar Industry in the United States.** — *American Grocer*, pp. 14-15. New York, 1 Febr. 1911.

United States: Philippines

The *Manila Bulletin* in a recent issue states that the output of cigars in the United States during the past fiscal year was 8 139 030 144. The official report from the internal revenue bureau showed that there was an increase of 313 330 524 in large cigars and an increase of 42 388 167 in little cigars. There was also the phenomenal increase of 1 776 583 714 in the output of cigarettes in a total of 7 852 874 622. There was an increase of nearly forty-eight millions pounds in the production of manufactured tobacco. That the tobacco industry is one of the most promising is shown by the reports of the bureau of internal revenue of the United States.

When it is remembered that the Philippines offer a special field for the cultivation of tobacco, and that as good tobacco as is grown in the world can be raised there, a wide field for investment and enterprise appears to be opening out.

575 **Process for the Synthetical Preparation of Ammonia by Catalysis at High Temperature.** — *L'Engrais*, 26^e année, N. 5, p. 129. Lille, Février 3, 1911.

France

Osmium is used, either pure or in combination, as a catalyser to produce the combination of nitrogen and hydrogen. It can also be employed mixed with other substances.

The reaction takes place at ordinary pressure, but a high pressure, e. g. 100 to 200 atmospheres is preferable. On adding finely divided osmium to a mixture of 3 parts in volume of hydrogen and 1 in volume of nitrogen at a pressure of 175 atmospheres and a temperature of about 550° C. 8 vol.% of ammonia is easily obtained.

G. Lehnert. **The Technique of Refrigeration.**—*Translated from the German by Gaston Dermine*, in-8, pp. VIII-281. Paris, Delagrave, 1910. 576

Mr. Lehnert's work gives a detailed study of the production of cold, both from the technical point of view and that of its economical development and importance.

Germany

He reviews the refrigeratory agents and their properties; the compression machines (compressors, condensers, evaporators, pipes, setting up and working); the absorption or affinity machine; the measure of the refrigeratory power, the cold storage plant of a brewery and that of a slaughter house. A special chapter at the end gives the data relative to estimates. The text is illustrated with numerous outline drawings.

Agricultural Engineering and Farm Machinery and Implements.

J. Rezek. **Development of Agricultural Machinery in Austria.** (Die Entwicklung des landwirtschaftlichen Machinenwesens in Oesterreich). — *Wiener Landwirtschaftliche Zeitung*, 61 J., No. 5, p. 45. Wien, Jan. 18, 1911. 577

The situation in regard to agricultural machines in Austria for 1909 is summed up in the following figures:

Austria

Total importation	11 288 000 Fr.
» exportation	11 631 000 »

A sum of 3 433 000 Fr. for scythes and sickles is not included in the exportation. The imports mainly comprise reapers, dairy apparatus and steam ploughs, and the exports threshing machines, sowing machines and ploughs.

English and American Direct Traction Steam Ploughs. (Englische und Americanische Dampfpflüge mit Direktem Zug). — *Deutsche Landwirtschaftliche Presse*, p. 59. Berlin, Jan. 21, 1911. 578

Great Britain. America Africa. Australi

English and American firms are much occupied with the construction of steam engines for the direct traction of ploughs, in consequence of the great demand for agricultural machines of this kind in Argentina, Australia and South Africa. These traction engines are so constructed, that they may be used also for threshing, chopping fodder, etc. They have the necessary power for drawing 6 or 8 turn-rest-ploughs, 8 or 10 cultivators, and 10 to 12 disk ploughs. The machines of this type built for Argentina are made to burn straw or wood.

In the dry prairie lands of North and South America, it costs only half as much to till the soil with engines of this kind as with ordinary animal traction. Eight acres of prairie land can be tilled in 10 hours at a cost of about 17 shillings by one of these machines drawing a multiple plough tilling a breadth of 9 ft.

579 J. REZEK and L. RICHTER. **Experiments with a Two Share Plough in Austria.** (Prüfung eines Zweischarpfluges type ZH6R von Rudolf Bücher in Raudnitz a. E.). — *Wiener Landwirtschaftliche Zeitung*, 61 Jr., No. 5, pp. 45-46. Wien, 18 Jan., 1911.

These are the results of experiments made by the Agricultural Machine and Implements Trial Station of the I. R. High Agricultural School of Vienna, with a two share plough, type ZH6R, of the firm of R. Bücher, of Raudnitz a. E.

The plough, which is entirely of steel, weighs 93 kg. and tills to a width of 455 mm.

Power required to draw the plough when not working: 12.5 to 14 kg.

Power required to draw the plough when working at a depth of 15.3 cm. 252 kg.

The best tillage conditions are at a depth of 13 to 14 cm.

In the stubble of cereals, the traction power required was still less, with oat stubble, at depths of 9.6 and 12.4 cm., the effort was respectively 126 kg. and 161,3, and in a barley field, at a depth of 9.8 cm., it was 147 kg.

Tilling speed with an ordinary oxen team: 58 to 65 m. per minute; with horses: 74 to 79 m. per minute.

Area tilled per hour, at a depth of 9.4 cm.; 0.09 to 0.15 hectares, according to conditions.

580 **Machine for Destroying Aquatic Plants.** — *Landwirtschaftliche Maschinen und Geräte*, N. 1. Artern, Sachsen, 14 Januar, 1911.

Germany The growth of aquatic plants is sometimes so luxuriant that it arrests the course of the water or impedes navigation. There is thus a necessity for an apparatus that will exterminate these plants rapidly. Such a machine has been constructed by M. Amiot, and consists of an iron boat with a motor in the centre which works at the same time the rudder and the propeller. The exterminator is placed at the side of the screw and consists of a frame with a long and sharp-toothed rake on the under side. The frame is lowered when the exterminator is set to work, and is then below the screw, the frame is raised above water again when its work is finished.

The depth to which the teeth of the rake are to penetrate can be regulated by a lever. Before starting the machine the frame is lowered, and the rake so regulated that its teeth touch the bottom of the water course, and the motor is then set going. The boat travels along slowly, the up-rooted plants rising to the surface and being gathered with sticks or rakes and placed in the boat, or in another boat towed along by it.

P. DIFFLOTH. **Rake-Roller for Rapid Tillage in Spring Sowing.** — *Journal d'Agriculture pratique*, No. 6, pp. 176-178. Paris, Fév. 9, 1911. **581**

France

The rake-roller is a new implement, derived from the old Norwegian harrow, and does excellent service in the work of cultivation. It is composed of two frames hinged together for convenience of transport, which bear the cross bars which act as axles to a number of sharp pointed stars. These stars revolving stir up and loosen the soil.

This implement is passed over the soil after it has been harrowed with the zig-zag harrow and before the seed drill is used. This latter to give the best results ought to be used only when the soil is perfectly and uniformly losened both on the surface and below. This result is obtained with the rake-roller. When beets are to be sown, the farmers, when pressed for time, use their machines in the following order:

Scarifier;
Zig-zag harrow;
Rake-roller;
Seed Drill.

Two New Machines for Potato Cultivation. (Neue Geräte für den Kartoffelbau). — *Wiener Landwirtschaftliche Zeitung*, 61 J., No. 13, p. 134. Wien, Feb. 15, 1911. **582**

Austria

A good potato crop is largely dependent on the uniformity with which the seed potatoes are distributed in the field.

It is with the object of attaining this result that two machines have been constructed by the firm of J. Carow, Prag-Bubna. One of them, to be drawn by two animals, serves for planting the seeds in from 2 to 6 rows, while the other is a cultivator, for surface work and banking. A new roller is also announced, which, with the *Ideal* machine for gathering potatoes, constructed by the same firm, promises to be an improvement for potato growing in the future.

583 E. Deligny. **Centrifugal Fertiliser Distributor.** — *Journal d'Agricultur pratique*, No. 1, p. 16. Paris, Janv. 15, 1911.

France

This is the description of a centrifugal distributor, the *Express*, which has been adapted for the spreading of fertilisers and the sowing of seeds. The essential parts of the apparatus are two horizontal trays furnished with radial wings, which are driven rapidly by the wheels. Above these trays there are two conical hoppers, which contain the fertiliser or seed. The apparatus is mounted on two large wheels and drawn by a horse or by oxen; it can work on very sloping ground. The fertiliser or seed is delivered very regularly, and the quantity can be regulated at will. The width covered by a single passage of the distributor varies from 2.75 to 10 metres, according to the nature of the fertiliser or seed. A man and horse can sow from 2 to 3 hectares per hour with this machine when using nitrate, which is spread over a width of 9 metres.

584 J. L. **The Perras Traction Spraying Machine.** — *Revue de Viticulture*, N. 893, p. 104. Paris, Janv. 26, 1911.

France

This new traction sprayer is interesting, because it is constructed on new principles. The apparatus is 0.55 m. wide, which allows it to be used in all kinds of plantations. The pressure is given by two pumps acting alternately and worked by two extensible cranks as well as by the wheels of the machine. The pressure given by the progress of the apparatus is always strong and regular and can be regulated at will. It is equally constant whether worked with 14 or 2 jets, and whether its progress is quick or slow. It only requires the receptacles to be refilled as soon as they are empty.

The spraying work of 8 men with the usual knapsack sprayers can easily be done by this apparatus in the time taken by one man.

The jets may be directed in any direction desired, and to any height, according to the requirements of the plantation. The apparatus may be drawn by means of shafts attached to its frame, or by whippletrees, so that it may be turned easily. It is very steady, and there is no fear that it will overturn.

585 **New Machine for Cleansing Crude Rubber.** (Guignet's Rohkautschuck-Reinigungsmaschine). — *Gummi Zeitung.* Berlin, Jan. 27, 1911.

France.
Great Britain

The "Crude Rubber Washing Company," of London, has had some experiments made with a new machine for cleansing crude rubber, which has been invented by a Frenchman, Mr. Guignet.

This machine, which was at first intended for freeing rubber from the wood of lianas, is now used for cleansing every sort of rubber, and answers perfectly to every requirement.

Houses fer Peasants and Farm Labourers in Apulia, Italy. (Case coloniche e popolari nelle Puglie). — *Bollettino degli agricoltori.* Roma, 31 Dec. 1910. **586**

The Minister of Agriculture has presented a Bill to the Chamber concerning measures to be taken for the construction of villages, farm houses and peasants' houses in Apulia.

The object of this Bill is to lighten the towns and villages of the rural population with which they are over crowded, and to induce this population to live in the country. For this purpose the new districts would be exempt from taxation for 10 years, whilst specially favourable loans and bounties would be granted for the building of the villages.

Ready-Made Buildings for Transport in Denmark. — *The Danish Export Review*, Vol. XVI, No. 1, pp. 3-4. Copenhagen, Jan. 1911. **587**

Denmark

The rapid and cheap construction of cottages for farmers is a problem of very great importance, which seems to be solved satisfactorily by the portable houses, of disinfected wood, made by the Danish Company Emmanuel Jensen and H. Schumacher. The building material is chiefly wood; it is sterilised before being used and covered with a water proof layer, usually asphalt.

If compared with the usual portable houses, these buildings offer the following advantages:

1) They are cheaper and do not cost much to keep up;

2) There is less danger of fire. They will resist a direct flame (800 to 900° C) for several hours without catching fire;

3) The insulating power of the material of which they are composed insure a constant temperature, agreably cool in summer and warm in winter.

Under certain conditions, these wooden house are even preferable to houses built of masonry:

1) They are built rapidly and can be inhabited immediately;

2) They are safe from earthquakes;

3) The inside area is large. While in ordinary brick houses the outer and inner walls occupy obout 25 % of the total area, the proportion is only 5 or 6 % in the portable houses. These portable buildings can be used not only for farm houses, but also for schools, small restaurants, hospital buildings, etc.

They are in use in the most diverse climates and conditions, from the West Indies to Greenland, where they have been tried with great success.

The article is illustrated by plans and elevations of the houses, etc.

588 BERGEROT. **Report on a Glazing System Proposed by the Reform Glazing Company (*Société de Vitrage rationelle*).** — *Journal de la Société Nationale d'Horticulture de France*, p. 777. Paris, Déc. 1910.

Franve

The Reform Glazing Company (*Société de Vitrage rationelle*) has proposed a glazing system to the Committee of Horticultural Arts and Industries, the object of which is to suppress the deposition of dew in the interior of greenhouses. The frame is made of a special iron, and the glass is striated in cross directions. The steam deposited on the glass is carried by the striae to gutters in the iron frame. The striated glass further has the property of breaking up the sun's rays, making the use of screens unnecessary.

The Commission appointed to examine the system has visited two buildings where it is applied and found them very satisfactory.

PLANT DISEASES

NOXIOUS INSECTS AND OTHER PESTS.

OFFICIAL COMMUNICATIONS

THE HUNGARIAN MINISTRY OF AGRICULTURE.

The Diseases of Crops in Hungary in 1910 (1). 589

The rainy weather in the spring caused the wheat to grow veryluxuriantly. Consequently, especially in the less ventilated valleys, *Erysiphe graminis* D. C. was seen in abundance, although it was not very harmful. Smut, as happens every year, caused much damage. The hot water or hot air treatment of seed is not generally known, and the only object of the usual methods is the destruction of the smut spores which adhere to the outside of the seeds. These methods are still very ineffectually applied in many localities. Linhart's renowned method, which consists in immersing the seeds in a $1\,{}^{0}/_{0}$ solution of sulphate of copper, is relatively speaking little used. *Tilletia Tritici* Wtr. and *T. Caries* Kühn; were equally the cause of smut. *Ustilago Tritici* Jens. caused loose smut, but without doing much damage.

The yellow Rust did much mischief especially in the southern part of the low Hungarian plains; the cause of this disease is the *Puccinia glumarum* Eriks. and Henn. The brown Rust (*P. triticina*) and the black Rust *P. graminis* did not do much harm.

Straw Blight (*Ophiobolus graminis* Sacc.) appeared sporadically in the whole country; it attacked not only wheat, but also barley and rye. The damage done by it, however, cannot be estimated at more than $0.1\,{}^{0}/_{0}$. This disease in 1899 attacked the wheat of the low plains with such virulence that many thousands of hectares were completely ruined. The energetic protective measures which were then taken (burning of the long stubble followed by deep ploughing) appear to have put a stop to the evil, which has only occurred at intervals since then.

Cereal Blight (*Cladosporium herbarum* Link) still further decreased the commercial value of the crops by attacking the wheat and other cereals after they had been reaped. Amongst fungi, *Septoria graminum* Desm. and *Macrophoma Hennebergii* Berl. and Vogl. occurred, but they did not do much harm.

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(1) The diseases of the vine are not included in this notice there being in Hungary a special institution for this branch: the Ampelographical Institute at Buda Pesth.

Rye was healthy throughout the country; the *Ophiobolus graminis* already mentioned caused as little damage as the Rusts (*Puccinia dispersa, P. graminis, P. glumarum*) which appeared in some places.

Barley was especially attacked by *Ustilago Hordei* Bref. and *U. Jenseni* Rostr. and *Helminthosporium gramineum* Rabenh. These diseases cause considerable damage nearly every year in our barley fields, and yet the hot water treatment of the seed does not gain ground.

Oats did not suffer from vegetable parasites at all (1), but a small number of plants were infected with *Puccinia coronifera* and *Ophiobolus graminis.*

Maize suffered greatly from the attacks of *Ustilago Maydis* Tul., which is the cause of serious losses every year· On the other hand, *Pythium de Baryanum* Hesse, which did some harm the previous year and destroyed the young plants, did not appear at all.

Havoc was wrought among potatoes by *Phytophthora,* owing to the wet summer. In some places the tubers had already begun to rot before being taken out of the ground, which aroused considerable fears for the winter time. But the havoc caused by this pest was not nearly so serious as that done by the Leaf Curl of the potato (Blattrollkrankheit) a malady which prevents the tubers from developing, so that they remain atrophied and shrivelled. With the object of investigating the causes of this disease and discovering the protective measures to be taken, our Institute, in conjunction with the Institute of Vegetable Pathology of Vienna, has been making some experiments, which however, have not so far given any practical results. Meanwhile, the disease is spreading more and more every year, and in some places is so virulent that a field of potatoes will not yield even the amount of tubers necessary for the next year's planting.

Our farmers are fighting the disease by importing seed potatoes from districts where the evil has not yet appeared, mainly from the north of Prussian Silesia and Galicia; their potatoes are used for planting in the regions where the disease has developed but slightly. The Potato Rot was observed at the beginning of the winter, and is considered to be caused by *Phytophthora, Fusarium Solani* Kühn and *Clostridium butyricum.* The Black-leg Disease caused by *Bacillus phytophthorus,* Appel, has not been seen in our country; in every case of stem Disease that was observed, the plants were found to be eaten by insects.

Throughout the greater part of Hungary, the seeds of the first sowing of beets were destroyed by Black-leg (Wurzel-brand) and a fresh sowing had to be made nearly everywhere. These second sowings also suffered severely from the disease, and presented many gaps. However, the rainy weather, favoured the growth of the beets, and in spite of the gaps the crops were satisfactory. In the drier soil of the low plain the cause of the malady was *Phoma tabifica* Prill. and Delacr. (= *Phoma Betae* Frank); in the damper soil of the northern regions it seemed instead to be due to the *Pythium de Baryanum*, Hesse. Some of the plants that were affected, however, showed no traces of any of the above fungi, and the disease was in this case caused by soil bacteria.

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(1) Among animal parasites *Oscinis Frit,* L. caused much damage to oats throughout the country. The Entomological Institute of Buda Pesth deals with these pests.

It was discovered through some recent experiments that if the seeds used for sowing are very dry, with a lower water content than 10 °/₀, the young plants which grow from them sprout up very quickly and are so robust that they resist the parasites. This fact will be utilised next year, and it is more than probable that this disease, the most dangerous of all for the beet, will disappear. The Black-leg disease has not appeared this year in any part where the dry seeds were used. Very little was seen of *Cercospora beticola* Sacc., and the harm caused by it was insignificant. The same may be said of *Clasterosporium putrefaciens*, which sometimes turned single leaves brown and destroyed them at an early date. The Heart or Dry Rot ("Herz" or "Trockenfäule"), caused by *Phoma tabifica* Prill. and Delacr. (= *Phoma Betae* Frank) did but little harm, thanks to the wet summer. During dry years this fungus causes considerable damage, especially in the low plain.

Lucerne was immune throughout the whole of the country, with the exception of some rare places where it was affected by *Rhizoctonia violacea* Tul. This disease was controlled successfully by isolating the parts attacked by means of deep ditches. In some places Turkestan Lucerne seeds were tried, but the plan miscarried and the Lucerne was destroyed by *Pseudopeziza Medicaginis* Sacc., against the attacks of which the Hungarian Lucerne is proof.

The small farmers, who use but little care as a rule in the selection of the seeds they buy, often have their crops half ruined by the Clover Dodder (*Cuscuta*, Kleeseide).

Both the common and the red clover were very much damaged by Clover Dodder, but only on the small farms. The first was in some places attacked by *Erysiphe Martii* Lév. and *Sclerotinia Trifoliorum* Eriks., and the latter by *Phyllachora Trifolii* Fchl.

Tobacco was attacked in some places by the Mosaic disease; against which we have no means of defending the plants, as we do not know its causes. But as it has been observed that it is generally propagated from one plant to another by means of the workmen, our tobacco planters have used every effort to prevent the men who have handled the diseased plants from touching the sound ones. By strictly observing this precaution, the spread of the contagion has been hindered. Broomrape (*Orobanche*) appeared only exceptionally.

The colza has not suffered in any way from vegetable parasites; we only received information of a few cases of attack by *Sclerotina Libertiana* Fuck,, and the damage done was insignificant.

The hemp also was very healthy, although short in spite of the abundant rain, and it blossomed early. This fact must be attributed to the use of seed from the North (Russia). The Russian seed sometimes does not succeed well with us, although it is very good in its own country; the plant is accustomed to very little heat, and as the temperature here in May is quite hot enough for the period of its development, its growth is arrested, and the plant flowers and runs to seed.

In many parts of the country the pods of the beans were damaged and the beans ulcerated by *Gleosporium Lindemuthianum* Sacc. and Magn. The peas were slightly harmed by *Ascochyta Pisi* Lib. The onions were attacked in some regions by the *Peronospora Schleideni*, and some destruction was caused amongst the cabbages by *Plasmodiophora Brassicae* (Finger-and-Toe), which rotted the roots.

Melons, cucumbers and pumpkins suffered all through the country from the attacks of *Pseudoperonospora cubensis*, because the frequent rains diluted and washed away the preventive solutions with which the leaves had been sprayed. The cucumbers were slightly attacked by *Gloeosporium lagenarium* Sacc. and Rum., the pumpkins by *Erysiphe communis* Wallr. *Sphaerella cucurbitae* Rostr. and *Bacillus tracheiphyllus*.

Large quantities of tomatoes became rotten in consequence of the attacks of the *Bacillus Lycopersici*, and in a few places the *Bivonella Lycopersici* was found on the roots

Considerable loss was caused to the growers of "paprika" (*Capsicum*) by *Colletotrichum nigrum*.

The apple trees as usual suffered greatly from *Fusicladium dendriticum* and *F. pirinum*. The spraying of the trees with a Bordeaux mixture cannot be very satisfactorily carried ont in Hungary and the fruit crop is consequently very moderate and of poor quality. The havoc caused by *Monilia Fructigena* was a little less, but still very considerable, whereas *Monilia cinerea*, *Phyllosticta Mali*, *Ph. pirina* (*Leptosphaeria Pomona*), *Oidium farinosum*, *Entomosporium maculatum* and *Penicillium glaucum* did in comparison but very little harm.

The stone fruit suffered greatly, especially from *Clasterosporium carpophilum* Aderh., which destroyed not only the leaves but also the branches. This fungus completely killed a large number of young trees, especially black and other cherries (*Griottiers*). *Monilia cinerea* Bon. did less mischief, but the peach trees suffered continually from the attacks of *Exoascus deformans*. In many regions, *Exoascus Pruni* deformed the plum trees, and the leaves of the latter were attacked throughout the country by *Polystigma rubrum* Tul.

Our gooseberry bushes have for the last two years been ravaged by American Mildew, which is continually spreading. We discovered it in the first place at Sz, Endre, near Budapesth, and here, by taking energetic measures and the expenditure of 60 000 crowns, we succeeded in completely eradicating this formidable disease. The defensive measures were applied under the direction and control of our Institute. But since that time, the malady has appeared in remote regions of our country, and it is to be feared that within a little while the whole country will be contaminated by this disease which is due to *Sphaerotheca mors uvae.*

Our most recent investigations are being made with the aim of finding the most resistant varieties of gooseberry, so that these may be substituted for the more susceptible kinds.

D. HEGYI

Director of the Institute of Vegetable Physiology and Pathology
at Magyaròvàr (Hungary).

INTELLIGENCE

Non Parasitic Diseases of Plants and their Control.

590 CLAUSEN, **The "Dry Spotting" of Oats.** (Die Dorrfleckenkrankheit des Hafers. — *Mitt. Deutsch. Landw. Gesellsch.*, Heft. 44, 191, pp. 631-639). — *Centralblatt für Bakteriologie, Parasitenkunde u. Infektionskrankheiten*, 29 Bd., No. 9-11, pp. 246, Jena, Feb. 15, 1911.

Germany

The "Dry Spot" disease, which causes the decay of the oat plant in the North of Germany — where it has been known for a long time — is according to Mr. Clausen of physiological origin.

The numerous investigations made on this subject for several years at the Biological Station of Dahlem, have shown that the great friability of the soil favours the growth of the disease, the origin of which should be sought for in the soil itself, and especially in its great alkalinity rather than in its deficiency in nutritive salts.

For the control of the disease, Mr. Clausen recommends that direct liming of the soil be abandoned. Nitrogen should not be administered to the soil in the form of nitrate of sodium but in the form of ammonium sulphate; also, phosphoric acid should rather be administered in the form of superphosphates than as Thomas slag. The dose of kainit could be increased, and after the soil has been sown with oats, it should be smoothed or rolled where possible. It is useful to administer sulphate of magnesia in solution as a top dressing, because it appears to protect the oats against the disease.

591 L. PETRI. **Sickening of Grafted Vines in Sicily and Algeria.** (Prime osservazioni sui deperimenti dei vitigni porta-innesti in Sicilia. Alcune osservazioni sopra i deperimenti delle viti in Algeria). — *Bollettino ufficiale del Ministero di Agricoltura, Industria e Commercio*, Anno IX, vol. II, Serie *C.*, fasc. 2°, 22 p., 1 tav., 3 figs. Roma, 1910.

Italy: Sicily Algeria

Mr. Petri gives an account of the first observations on the declining of vines reconstituted with American vines in the provinces of Palermo, Trapani and Syracuse.

Mr. Petri gives a detailed description of the most prominent diseases, and arranges them in the following classes, according to their exterior characters:

1) Withering of single vines or small groups which do not constitute a real infection spot or zone with progressive diffusion. The upper part of the vines attacked presents the characters described as specific of the "short internode" or "roncet," in a more or less accentuated degree. The roots are generally in good condition, but in compact and over-damp soils traces of rot may be observed, and the leaves also present lesions due to the *Drepanothrips Reuteri.* Few or no phylloxeric lesions are found on the secondary roots. In this class the writer also ranks those cases which, whilst presenting several characteristics of "roncet" ought in all probability to be attributed to the action of some "cecydont," (probably an acarus).

2) Wasting which also appears on isolated plants or on small groups, but in which no deformation of the leaves and branches takes place. The growth proceeds with difficulty, the leaves turn yellow and the internodes seem to contract. The roots always become rotten, and the full-grown roots are often crooked and their extremities turned towards the surface of the soil. The pith of the roots, trunk and branches turn the colour of yellow ochre.

3) Sickening manifested by widely spreading patches in vineyards, the vine stock frequently drooping and dying or becoming weak in the centre of the patch. The diseased patches have a tendency to extend. The part of the vine above ground has a feeble development, but does not present other noticeable alterations. The primary and secondary roots present numerous phylloxeric lesions accompanied by rot, which is very superficial in roots of 3 years and more, but penetrates deeper in those of 1 and 2 years old.

4) Wasting manifested by more or less extended patches of diseased plants in vineyards and distinguished from those caused by phylloxera in that the weakening of the central and peripheral stocks is not very different. The diseased vines, in addition to a very depressed vegetation, present characters analogous to those of "roncet" such as the contraction of the internode, otherwise very rare. Fasciation of the vine branches is frequently met with, on the contrary, in some varieties. Phylloxera is practically never met with on the roots, or if so, the lesions which are produced in the less resistant vines are only superficial and could not be the cause of wasting. On the radicels and in the surrounding soil a number of white coccinellae are to be found, the *Rhizoecus falcifer*, Künkel, on the subject of which Mr. Petri gives some biological indications. This kind of decay is not always distinct from that caused by the "Roncet."

Before attributing the decay to the *Rhizoecus*, M. Petri is of opinion that it is necessary to make more extensive investigations as well as experiments that will allow the conditions to be determined under which parasitism of the *Rhizoecus* on the roots is produced.

The wasting of the graft bearing stock in Sicily has induced the writer to make a closer study of the older plantations in Northern Africa, where the climate and soil are comparable to those in Sicily.

The result of observations made in some localities in Algeria, show that serious decay is due in most cases to the exhaustion caused by an over-abundant production, nearly always observed at the 2nd and 3rd year after grafting. To this cause must be added in certain cases the lack of affinity between the stock and the scion and the more or less unfavourable conditions of the soil.

All parasitic action, according to Mr. Petri, must be excluded from the probable causes of the decay observed in the vines grafted on American stock; phylloxera must be excluded, as well as the *Rhizoecus* and parasitic root-rot.

592 M. MIRANDE. **Coal-tar Products and Vegetation used in Agriculture: Their Action on Green Plants.** — *Comptes-Rendus hebd. des séances de l'Académie des Sciences*, premier semestre, tome 152, N. 4, pp. 204-206. Paris, 23 Janv. 1911.

Franae

Mr. Mirande recently (*Comptes-rendus*, 21 Nov. 1910) described the physiological action of tar vapours on green plants. A similar injurious action is produced on green plants by a certain number of substances derived from coal tar and containing creosote (carbonyle, green oil, carbolineum, carboneine, etc.) which are used in horticultural and agricultural practice.

In a small enclosed space, where the air may easily be charged with a sufficient proportion of the vapours of these substances, the buds, leaves and flowers are rapidly and differently affected and are sometimes even killed. It is dangerous to use these substances in green-houses and glass houses; stakes and poles treated with them have often been harmful to the roots and buds of plants. The effects produced by tar-products are similar to those which Mr. Mirande has described for vapours in general and particularly for the vapours of organic substances. The vapours produce in the green cell *blackening* and *discharge*, after the plasmolytic death of the cell. Before these phenomena become apparent, and while the cell is still quite green, the chlorophyllian function is suspended.

These substances act strongly in the same way by contact. Mr. Mirande recommends care in the use of tar-products.

L. PETRI. **Observations on the Olive Tree and some of its Poisons.** (Beobachtungen ueber die Schädliche Wirkung einiger toxischer Substanzen auf den Oelbaum). — *Chemiker Zeitung*, XXXIV, p. 585. Cöthen, 1910. **593**

Germany

The experiments deal with the sulphates of copper, zinc, lithium, sodium, cobalt, with chloride of nickel and acetate of uranium. Out of all these substances, the only one which is not injurious is the last. The toxic substances accumulate particularly in the older leaves, the chlorophyll of which partially decomposes and dries. Cobalt hindered the growth of the young shoots. The *Ascochyta Oleae* developed on leaves whose vital energy had been enfeebled by the poisonous action of sodium chloride.

It is possible that infection by other weak parasites is due to the previous damage caused by the action of chemicals.

T. HEDLUND. **The "Leaf Shrivelling Disease„ of the Potato.** (Nagra iakttagelser öfver bladrullsjuka hos patatis). — (*Tidskrift för Landtmän*, XXXI, pp. 512-515, 532-541. Lund, 1910). *Botanisches Centralblatt*, Bd. 114, N. 22, pp. 567-568. Jena, Nov. 29. 1910. **594**

Sweden

Mr. Hedlund has been making some investigations near Alnarp (South Sweden) into the "leaf shrivelling„ disease of the potato. He is first of all of opinion that the disease may be manifested without parasitic infection from potatoes already attacked by the disease. Further, the cause of the disease should be sought for in the irregularity caused in the respiration of the underground parts by falls of temperature and wet weather; to which causes must be added also the great compactness of the soil or the deep planting of the tubers.

The pathological condition persists throughout the entire vegetative period of the potato; the formation of the tubers is greatly hindered by the disease: the tubers of a sick plant give rise to new growths which are diseased, even when the other factors are favourable during the first period of development; the plants grown from these tubers have a feebler growth than the diseased plants which grow from sound tubers.

The disease is in all probability not infectious; it should be considered as a change of a pathological character. For its control the writer suggests sowing the tubers superficially in a very mellow soil, liming and using only tubers from healthy plants.

V. STÖRMER. **Curling of Potato Leaves.** (*Kartoffelblattrollkrankheit*). See No. 622 in this Bulletin. **595**

596 L. Ravaz. **On the "Short-internode" (court-noué) in Vines.** — *Progrès agricole et viticole*, No. 1, Montpellier, pp. 9-10, 1 Jan. 1911.

France

Mr. Ravaz reports on some observations which have been made on stems affected by "short-internode" some days after a white frost. He has remarked that the wood of the previous year is not in the least affected by "short internode"; that the drawing together of the nodes takes place at different distances from the base of the branch, and extends to a small number of internodes; lastly, that only the highest and oldest branch of the shoot which has been cut down is attacked. When the vines were pruned the following year the eyes of the portions bearing short internodes were kept; the buds which developed from them in spring all grew into branches which were short-knotted only on the two lower internodes. After the pruning of the following year, all the branches were sound. The short-internode is therefore not permanent in these circumstances.

As to treatment, Mr· Ravaz thinks that the necessary measures should be taken for checking vegetation at an early date.

Parasitic Diseases of Plants. Generalities. — Parasitism. — Bacteria and Fungi as Parasites and Saprophytes.—Remedies.

597 M. C. Potter. **Bacteria in Vegetable Pathology.** (Bakterien und ihre Beziehungen zur Pflanzenpathologie). — *Centralblatt für Bakteriologie, Parasitenkunde u. Infektions-krankheiten*, Bd. 28, N. 28, pp. 624-640. Jena, Dec. 17, 1910.

Great Britain

This paper read by Mr. Potter before the English Mycological Society, explains in a concise manner the present condition of those vegetable pathological studies connected especially with bacteriology. An extensive bibliography is given.

598 E. Mayor. **Parasitic Fungi of the Canton of Neuchâtel.** — *Bull. Soc. Neuchâtel Sc. nat. Annales mycologici*, vol. IX, N. 1, pp. 125-126. Berlin, Feb. 1911.

Switzerland

An enumeration of the parasitic fungi found in the Canton of Neuchâtel and belonging to the Phycomycetes, Uredineae, Ustilagineae and

Erysipheae, This list shows that the Canton of Neuchâtel possesses a very rich cryptogamic flora; the writer cites no less than 250 species of Uredineae alone. Amongst the fungi dealt with in this work are: *Peronospora parasitica* (Pers.) Bul., parasite of *Reseda Luteola; Ochrospora Sorbi* (Oud.) Diet., which lives on *Pyrus communis, Sorbus Aria, S. latifolia, S. torminalis,* etc.

G. Woronow. **Fungi of the Caucasus.** (Contributiones ad mycofloram Caucasi I. — *Trudi a. d. Bot. Sada Tiflis,* Vol. XI, 1910, pp. 133-171). — *Annales mycologici,* Vol. IX, No. 1, pp, 128, Berlin, Febr. 1911. **599**

Russia: Caucasus

This first contribution to the mycological flora of the Caucasus, which has so far been very little studied, deals with the enumeration of 368 species. Out of this number, Mr. Woronow describes as new *Mycosphaerella Woronowii* Jacz., which lives on the leaves of *Juglans regia,* and *Coleosporium Datiscae* Tranzsch.

There are many rare species amongst those enumerated, and many others have been observed on new plants.

W. Tranzschel. **Contribution to the Life History of Uredineae.** (Beiträge zur Biologie der Uredineen III. — *Trav. du Mus. Bot. de l'Ac. Imp. des Sc. de St-Petersburg,* Bd. VII, 1910, pp. 1-19). — *Rivista di Patologia vegetale,* anno IV, No. 18, pp. 285-286, Pavia, Dec. 15, 1910. **600**

An account of numerous experiments made with the teleutospores of the different species of *Puccinia* and other Uredineae, with the main object of discovering their aecidiospore form.

It is observed that *Puccinia Porri* (Sow.) Wint., which attacks various species of *Allium,* is a *Hemi-Puccinia,* in the sense that the basidiospores produced by the germination of the teleutospores attack the *Allium* directly and give rise to the uredospore form without passing through the aecidiospore form. The teleutospores of *P. Maydis* Béreng. produce aecidia on *Oxalis corniculata* L.; those of *P. Poarum* produce them on *Tussilago Farfara* and not on *Petasites officinalis*; consequently, the *Aecidium* which is found on this last Composita does not belong to the Puccinia in question.

Mr. Tranzschel did not obtain positive results in experiments made with the teleutospores of *P. Iridis, P. glumarum, P. Veratri,* which were sown on very different wild plants.

C. Appel and E. Werth. **Infection Experiments with *Plasmodiophora Brassicae* Woronin.** (Infektionsversuche mit *Plasmodiophora Brassicae* Woronin. — *Mitteilungon a. d. K. biol. Anst. f. Land- u. Forstwirt.,* Heft 10, Berlin, 1910, pp. 17-18). — *Rivista di patologia vegetale,* anno IV, No. 18, pp. 282-283, Pavia, Dec. 15, 1910). **601**

Germany

Various Cruciferae were sown in a soil containing the roots of cabbages suffering from "Finger-and-toe," disease caused by *Plasmodiophora*

Brassicae Wor. It was observed that the disease also attacks *Erysimum strictum*, *Sisymbrium austriacum* and *S. strictissimum*. In *Erysinum* the infection only causes slight swellings of the roots, while in the other plants it produces tubercles with irregular lesions. *Plasmodiosphora Brassicae* does not cause the roots of *Raphanus sativus* to swell, but it blackens them.

602 C. O. Hanson. **Resistance of Larch to "Canker.„** (Some measurements of Larch in the Forest of Dean and Neighbourhood — *Quarterly Journal of Forestry*, vol. V, N. 1, p. 34. London, Jan, 1911.

Great Britain: England

Numerous fructifications of *Dasyscypha calycina* (1) have been found in nearly all the branches of the different larch plantations described, although no canker was discovered on the trees themselves.

This is due to the fact that the disease was developed in the Forest of Dean at a time when the trees, which have remained exempt, were more than 30 years old, being protected by a thick bark. In the more recent plantations, dating from less than 30 years, and with unfavourable conditions of soil and other disadvantages the larches are attacked by canker.

603 V. Peglion. **On the Ascophore Form of the Vine Oidium.** (Intorno alla forma ascofora dell'Oidio della Vite). — *Rendiconti della R. Accademia dei Lincei, Classe di Scienze fis., Matem. et nat.*, vol. XIX, pp. 458-459. Rome, 1910.

Italy

Completing the information previously supplied on the ascophore form discovered at Ferrara, of the vine Oidium, Mr. Peglion adds to-day that the formation of the perithecia begins from September, when the leaves attacked are still in full vegetative activity; this formation continues — in proportion as the ripe perithecia are detached — till towards the end of autumn; it has therefore a certain importance for the preservation of the species.

The custom of stopping all measures against Oidium after August is a mistake.

604 F. Couston. **Use of Formalin against the "Smuts„ of Cereals.** — *Journ. d'Agriculture pratique*, N. 1, p. 14. Paris, Jan. 5, 1911.

France

Mr. Couston is in favour of the use of formalin in the treatment of seeds (wheat, barley, oats, maize, etc.). He treated wheat grains with a solution of 1/3 of a litre of formalin to 100 litres of water (3 p. 1000) for ten minutes, and at harvest he did not find a single black ear, while in a neighbouring strip of land, where the seeds had not been treated with formalin, several of the ears were blackened. The action of formalin on wheat smut (*Tilletia caries*) has been proved by the experiments of Mr. Martinet, of Lausanne, which show this substance to be more effective than all others, more than copper sulphate with, or without lime. This is probably due to the fact, that the volatile nature of formalin allows it to penetrate easily into the grains, affected with "smut.„

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(1) Ascomycete, more commonly known under the name *D. Willkommii*. *(Ed.)*.

Smut Preventives. Report of Experimental Farm for Manitoba. — *Experimental Farms*, p. 345. Ottawa, Canada, 1910. **605**

In the course of the past twenty years, several chemical products have been tried as a preventive of the "smut„ in cereals. It has been easy to control the disease in the cases of wheat and oats, but no practical process has yet been found that protects barley entirely from its attack. **Canada**

The formalin treatment, however, has been found very satisfactory, after a number of trials. Formalin can now be procured easily ; it is cheap; the solution is quickly prepared, and there is no doubt of its efficacy, when applied with care.

A pound of formalin serves tor thirty-two gallons of solution, which is sufficient for treating forty bushels (about 1440 litres) of wheat, or twenty-eight bushels (about 1000 litres) of oats.

Immersion and spraying gave equally good results, but in both cases, the operation should be carried out with great care, otherwise it is ineffective.

Copper sulphate is likewise useful as a remedy against "smut,„ but it has not given as good results as formalin. A solution of copper sulphate of the desired strength may be obtained by dissolving a pound of copper sulphate in six gallons of soft water. The method of application is of no importance in this case, provided that each grain has been well soaked.

Among the other treatments used were sulphite of potassium, iron sulphate, agricultural bluestone, "massel" powder, "anti-fungi," salt and hot water.

None of these compounds can be compared in efficacy to formalin and copper sulphate. The treatments with hot water and with potassium sulphite really prevent the disease, but their mode of application is so complicated, that their use could never become general.

Agricultural bluestone and anti-fungi are two mixtures of copper sulphate and iron sulphate, and their efficacy is in proportion to the quantity of copper they contain, the iron sulphate having no value as an anti-cryptogam remedy.

No effective remedy against the loose smut of wheat has been found so far. It is a very different disease from "stinking smut" or "bunt.„

606 W. STÖRMER. **Beet Seeds submitted to a preventive treatment of Phenol and water.** (See N. 426 in this *Bulletin*).

607 **Soap and Bordeaux mixture: "Sulfabion.„** See N. 660 in this *Bulletin*.

Parasitic Diseases of Various Plants and Means of Prevention and Cure (1).

608 J. MIYAKE. **Rice Fungi in Japan.** (Studien ueber die Pilze der Reispflanze in Japan). — (*Journal of the College of Agriculture Imp. Univ. of Tokio*, vol. II, 1910, pp. 237-276, tab. XIII-XIV). *Annales mycologici*, vol. IX, N. 1, p. 126. Berlin, Feb. 1911.

Japan

Whilst studying the parasite fungi of rice in Japan, Mr. Miyake found 44, which belong almost exclusively to the Ascomycetes and the *Fungi imperfecti*: many of them live as simple saprophytes, but others cause more or less serious damage to rice.

The most frequent species in Japan are; *Mycosphaerella Shiraiana* n. sp.; *Sphaerulina Oryzae* n. sp.; *Phaeosphaeria Oryzae* nov. gen. and nov. sp.; *Metasphaeria albescens* Thuem.; *Pyronochaeta Oryzae* Shirai n. sp.; *Phaeoseptoria Oryzae* n. sp.; *Dactylaria grisea* (Cke) Shirai; *Helminthosporium Oryzae* Miyabe and Hori; *Sclerotium irregulare* n. sp.; *Ustilaginoidea virens* (Cke Tak. All these fungi are very injurious to rice.

Thirty out of the total number of species enumerated are new; they are described minutely, and their characteristics are given in German.

The new genus *Phaeosphaeria* is distinguished from the genus *Sphaerulina* by having coloured spores, and from the genus *Leptosphaeria* by the presence of paraphyses.

609 R. BERGE. **The Chevrièr Bean and Rainy Weather in Normandy.**— *Bull. des séances de la Société Nationale d'Agriculture de France*, tome LXX, No. 10, pp. 890-893. Paris, 1910.

France: Normandy

During the past two years, the crops of the alluvial soils of the Lower Seine have been particularly tried by the incessant rain. The Chevrier bean, which plays an important part in the rotation of crops on the farm of Petit-Ehelan, has particularly suffered. The "Sclerotium disease" (*Sclerotinia Libertiana*) developed in 1909 without the outer aspect of the plants disclosing its ravages. As the plants were already considerably damaged by the disease, no satisfactory results were obtained from the anticryptogamic treatment. During 1910 the first plants gathered were invaded by *Sclerotinia.* After being pulled up, all the diseased plants were abundantly watered with a concentrated solution of iron sulphate, at the time when they were laid out to dry. The result this time was surprising; the five hectares of beans treated in this way gave, after being sorted by hand, about 90 quintals of dry beans of good quality.

It is interesting to note that the same solution of iron sulphate sprayed on the plants while growing had no effect in preventing the progress of the disease.

Another remarkable fact was observed. The heavy rainfall caused a field of beans, of about half a hectare, to remain under water (the water was 10 cm. deep) from the middle of June to the end of July. The submerged beans on this field continued to grow, giving, it is true, a very poor crop, of 4 to 5 quintals of dry beans. But the plants which were gathered were perfectly sound, and their beans, slightly smaller in size than usual, were well formed, green, and of the best quality.

Wart Disease. Black Scab of Potatoes. (*Synchitrium endobioticum* Percival). — *Board of Agric. and Fisheries,* Leaflet, No. 105. **610**

The disease known under the name of "Wart Disease" or "Black Scab," attacks the tubers and stems of potatoes; it causes numerous irregular excrescences, which become black and rotten with time.

Great Britain

The parts infected contain immense numbers of spores of *Synchitrium endobioticum*, which is the determining cause of this disease. The spores are capable not only of infecting sound plants the following season, but also remain in the soil for several years in a latent condition.

The following are remedies and preventive measures:

1) Tubers from infected fields absolutely must not be used as seed potatoes;

2) The disease must be controlled from its first appearance; the diseased plants must be pulled up and burnt;

3) Good results are also obtained by treating the soil with gasometer lime in the proportion of 2 lbs. per yard (1.07 kg. per sq. metre).

611 A. MAUBLANC. **Crown Canker of Cotton Plants.** (Les maladies des plantes cultivées dans les pays chauds). — *Agricutture pratique des pays chauds.* No. 93, p. 510. Paris, déc. 1910.

France

Some doubt has recently been cast by Butler (1) on the parasitism of *Neocosmospora vasinfecta* considered as the cause of the "crown canker" of the cotton plant and various other plants. He considers this fungus as a saprophyte; the cause of the "crown canker" is still obscure.

612 **Root Tumours of Sugar Beet.** — *Journal of theBoard of Agriculture*, pp. 830-831. London, Jan. 1911.

Great Britain

Specimens of diseased sugar-beet from Norfolk, where this crop has been extensively grown during the past season have recently been submitted to Kew for investigation,. The roots bore large tumours or outgrowths, attaining in one instance to the size of a cricket ball. These outgrowths, varying from 1 to 3 in number, originate from points near the crown of the root, and are attached by a comparatively small neck, although during growth the tumour spreads over the surface of the root, and appears to be attached to it by a broad surface. On the Continent the fact is well established that tumours only develop on sugar-beet when grown on very dry, more or less sandy soil, and that no trace of the disease has been observed on roots grown in somewhat cold, wet, loamy soil. The tumours bear a superficial resemblance to outgrowths on the roots of sugar-beet, caused by a fungus called *Urophlyctis leproides*, Magnus.

613 A. MAUBLANC. **Diseases of the Sugar Cane.** (Les maladies des plantes cultivées dans les pays chauds. Suite (2) — *L'Agriculture des Pays chauds*, No. 92, pp. 379-400, and No. 93, pp. 502-506. Paris, Dec. 1010.

France

While studying the diseased roots of the sugar cane, Wakker found several fungi about the role of which little is known, but some of which are probably parasites. Among these are the *Pythium* (?) sp., discovered by Treub and which circulate in the cells of the root rind. The name is only provisional, there being nothing to justify its connection with the genus *Pythium*. According to Tschirch, it is not a parasite, but simply a fungus entering into the constitution of the mycorhiza. The parasitism of the *Allantospora radicicola* Wakker has not been proved experimentally, either. Tbe *Dematium javanicum* Wakker seems to be nothing more than a saprophyte. Lastly, there is another fungus, the mycelium filaments and the chlamydospores only of which are known, and which, according to Wakker, is a parasite of the sugar cane.

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(1) BUTLER, *The Wilt Disease of Pigeon Pea and the parasitism of "Neocosmospora vasinfecta."* SMITH, *Mem. of the Dept. of Agric. in India. Bot. Ser.*, II, No. 9, 6 pl. Jan. 1910. [*Ed.*].

(2) *Agric. pratique des pays chauds*, Nos. 80, 90 91.

The roots of the sugar cane are also attacked by several anguillulae; two species particularly are clearly parasites: the *Heterodera radicicola* Müller and *Tylenchus Sacchari* Solt. The first produces galls on the root of the cane which sometimes grow to the size of a hazel-nut. The *Tylenchus Sacchari*, which is not the cause of the "sereh" disease, as was thought at first, attacks the young roots, which turn from white to a vermilion red and are finally killed. Moisture is very favourable to the development of the parasite, whilst drought is injurious to it. The *Tylenchus* is spread about by the soil, water and by cuttings.

There are several species of Phanerogams living as parasites or hemi-parasites on the sugar cane: 1) *Santalum album* (Santalacea); 2 *Alectra brasiliensis* Benth. (Scrofulariacea); 3) *Striga euphrasiodes* (Scrofulariacea); 4) *Aeginetia indica* Roxb. (Orobanchea).

Amongst the diseases of the leaves Mr. Maublanc cites the following:

1) "Rust," due to a Uredinea parasite, the *Uromyces Künii*, Krüger; this causes the appearance of orange-brown spots on the leaves, which are striated in form and slightly raised. The damage done is unimportant, and worth remarking only in damp plantations and on the tender leaves of luxuriantly growing canes. The only remedy known is the destruction of the diseased leaves and the reduction of the quantity of nitrogenous manure.

2) "Red-spotted disease of the leaves" (*Cercospora Köpkei* Krüger). Little harm done except in damp regions. Remedy: burning the diseased leaves.

3) "Eye-spot disease" (*Cercospora Sacchari* van Breda de Haan), found at Java, becomes a serious danger above the altitude of 1300 m., causing the premature death of the leaves and lessening the crop. Bordeaux mixture seems to have given good results.

4) *Cercospora longipes* Butler, in Bengal; damage caused insignificant.

5) "Red-spot disease of the sheath" (*Cercospora vaginae* Krüger), found extensively in Java, attacks the sheaths without infecting the stalks. There is no special treatment.

6) "Black-spot disease" (*Cercospora acerosum* Dickhoff and Hein), which has been observed in Java on canes of all ages, is very prevalent where the air is damp and at an altitude of between 700 and 1700 m. It causes the leaves to dry up.

7) "Round-spot disease" (*Leptosphaeria Sacchari* v. Breda de Haan) causes spots similar to those due to the *Cercospora Sacchari*. If the spots

are numerous a considerable amount of damage is done, because the leaves dry up. No other treatment is known than the destruction of diseased leaves.

8) *Venturia Sacchari* Sacc. is found at Java, where it does not do much damage on account of the fact that it attacks only full grown plants.

9) *Sphaerella striatiformis* Cobb. is a disease which is as yet but little known, and has not so far been treated in any way.

10) *Phyllachora* (*graminis?*) does but little damage; it may be identical with the *Phyllachora graminis* Fuck.

11) *Pestalozzia* sp., a disease which is very slight, and is very little found at Java; Krüger has not specified it, but Wakker has described it under the name of *Pestalozzia fucescena* Sor. var. *Sacchari*.

12) "Sclerotic disease of the leaves" is caused by a fungus, not yet determined, which is propagated by sclerotia: it is a serious disease, but not very diffused in Java. It is recommended that the parts affected be burned.

13) "The red rot of the sheaths" (*Sclerotium* sp.) is a serious disease which is characterised by the brick-red colour of the sheaths affected. It is distinguished from others, and especially from *Cercospora vaginae*, by the fact that the diseased parts are not clearly defined and do not blacken at the centre. The stalk may be invaded in its turn. Sclerotia are formed on the parts destroyed. The fructifications are not known, so that the fungus cannot be classified. The disease is very wide-spread in Java, where it kills the leaves.

14) The "acid rot of the sheaths" (*Sclerotium* sp.) is very close to the preceding, but the leaves turn more purple in colour and the parts affected give off a characteristic acid odour. Some sclerotia are found, but no form of fructification, which makes it impossible to classify the fungus, This disease, which is very little found at Java, causes but small damage.

The treatment of these two last diseases consists in taking away and burning the sheaths affected in order to prevent the formation of sclerotia.

15) The "smut disease" is very wide-spread in the sugar plantations of British India. It follows the attacks of a cochineal, the *Aleurodes harodensis* Mask. The fungus is not yet known in all its forms, and is not yet definitely classified.

The treatment should be exclusively directed against the insects.

614 E. J. Butler. **The Leaf Spot of Turmeric, *Taphrina maculans* Sp. Nov.** — *Annales mycologici*, Vol. IX, No. 1, pp. 36-39, 1 fig., IV pl. Berlin, Feb. 1911.

At Gujarat (Bombay Presidency), at Saharanpur (United Provinces) and Rangpur (Eastern Bengal), a fungus has been observed on the *Curcuma* *longa* L. (1), and also, near the last-named locality, on the *Zingiber Cassumunar* Roxb. (2), which damages the leaves of these two plants, greatly hindering their assimilative functions.

Although this disease is not regarded as serious by the native planters, it is none the less probable that it is the cause of the falling off of the crops, which might be greatly increased.

The parasite is characterised by small spots which run into one another, and which, although they are often found to a considerable extent on both sides of the leaf, are much more numerous, as a rule, on the upper side.

These spots, which are at first of a pale yellow colour, soon become darker in tint, and sometimes turn to gray.

The study of this parasite has led Mr. Butler to consider it a new Ascomycete, which he has named *Taphrina maculans* sp. nov.

A. MAUBLANC. **Diseases of the Coffee, Tea and Cacao Trees.** (Les maladies des plantes oultivées dans les pays chauds. Suite). — *L'Agriculture pratique des pays chaud*, No. 93, pp. 506-512. Paris, Dec. 1910. **615**

Guatemala.
Java.
Samoa.
San Thomé

Amongst the diseases of the Coffee tree the *Hemileia vastatrix* and the *Stilbum flavidum* must be mentioned. Massee found on the spots caused by the latter parasite some perithecia of a Hypocreacea, which he regards as the perfect form of the fungus, and has named it *Spaerostilbe flavida*.

D'Herelle also has studied a disease of the Coffee tree, which has almost entirely destroyed some of the plantations at Guatemala. This disease is characterised by a swelling and cracking of the bark; the leaves turn yellow and fall, and the tree dries up. Every variety of coffee tree is attacked. D'Herelle has found the cause of this disease in a fungus with the spores of which he has been able to reproduce the symptoms of the disease. He has described the cryptogam under the name of *Phthora vastatrix* and has classed it amongst the Spheriacea, but this classification is not quite sure yet.

Ch. Bernard has observed a disease of the roots of the tea plant at Java, which is due to fungi that are not as yet determined. The plants attacked by the fungus wither and die off rapidly after losing their leaves. This disease appears specially in young plantations, on soils that have been cleared and around the large tree trunks that have been left in the ground. The diseased trees should be pulled up and burnt, and the neighbouring trees watered with lime water. Ch. Bernard has also observed several diseases which attack the young plants. In one case the radicles became rotten as soon as they came out of the seed, and contained an undetermined mycelium; in a second case the attack appeared later, and was made on the young plants which had begun to grow well. Ch. Bernard recommends that the seeds be well disinfected, that the nurseries be covered when the heat is too great, and that if the soil is too damp it be drained.

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(1) Scitaminaea of Tropical Asia, the rhizome of which is used in the dyeing trade, in medicine and as a condiment. Cf. G. WATT, *A Dictionary of the Economic Products of India*, vol. II, Calcutta, 1889, pp. 659-669.

(2) Scitaminaea of Tropical Asia. The rhizome is very much used in native therapeutics, but has not yet entered into trade. Cf G. WATT, op. cit., vol. VI, London-Calcutta, 1893, pp. 357-358. [*Ed*].

Brick has recently described a disease which attacks the young plants of the Cacao tree in the first months of their growth, in the Samoan Islands. The whole of the plant is invaded; Small dark points appear on the bark, the youngest leaves turn yellow and dry up, and finally the plant dies. A *Pestalozzia* allied to the *P. Guepini*, is probably the cause of the disease. The same writer has found a *Fusarium* on the branches of a Cacao tree from Kamerun the mycelium of which penetrated through the bark and the wood; he named it the *F. decemcellulare*. The fructification appear like small colourless or pale red pustules; the conidia are very long, and composed of 10 cells.

There is no proof of the parasitism of this species, which seems to be very close to the *Fusarium* form which accompanies the perithecia of the *Nectria* and *Calonectria* on the cankers of the Cacao branches.

Lastly, Guéguen has recently studied a disease which has caused considerable havoc at San Thomé, and which he calls "smut" or "black" of the seeds; the sooty coating which covers the seeds in the inside of the cacao pod and also the seeds which are kept in ware-houses is due to the mycelium of an *Acrostalagmus* which Guéguen considors to be a simple form (f. *thomensis*) of the *A. Vilmorinii*. He does not appear to have any doubt that the punctures of the *Xyleborus perforans* play an important part in the invasion of the cacao pods by the fungus.

616 **Ecuador.** ***Botryodiplodia Theobromae* Pat. in Ecuador.** — See No. 466 in this *Bulletin*.

617 **The *Phytophthora* of Tobacco in the Dutch Indies.** (Bestrijding der *Phytophthora*-ziekte van de tabak in Nederlandsch-Indie). — *Cultura*, 23 ste. Jaargang, No. 280, pp. 94-95, Feb. 1911.

Dutch Indies

In various localities of the Dutch Indies, tobacco plantations are damaged by the *Phytophthora Nicotianae*, which attacks both the leaves and the stem after the transplanting. This species of Phytophthora is characterised by the remarkable size of the conidia and by the presence of oospores, which had not previously been remarked in the *P. infestans*.

The conidia are easily spread about by the wind; the spores, which might remain in the soil for two or more years without losing their vitality, are spread by man, animals and water.

The following preventive measures and remedies are recommended:

To give the plants plenty of air and light; to paint them over with Bordeaux mixture at an early date; to water the soil with a 1 °/₀₀ solution of permanganate of potassium.

R. Farneti. **The Gangrene of Asparagus Crowns.** (La cancrena delle zampe d'asparago). – *Rivista di Patologia vegetale*, anno IV, No. 18, pp. 273-277, Pavia, Dec. 15, 1910. **618**

Italy: Emilia

Mr. Farneti has made a study, on material from the province of Bologna, of a serious disease which has for a long time past attacked the crowns of asparagus (*Asparagus officinalis*).

When the diseased rhizomes are cut, it is found that the half which is turned towards the exterior, the part on which the buds develop, is dead or dying in consequence of a gangrene, and a narrow outer zone of the back which bears the roots is also found to be in the same condition, while the intermediary internal part is still sound in appearance.

If the progress of the infection be followed, it will be seen that it begins in the hinder and older part of the rhizome, and that in the beginning, even on the front, it only attacks the peripheral zone of the stalk. As the disease makes headway, howewer, towards the front, it gains more and more in depth towards the axis, which it reaches and passes when the diseases attacks the terminal bud.

The diseased tissues become of a dark brown colour, which is more intense towards the outside; the infected roots are grayish-brown which fades away towards the extremity, so that in plants which are only partially affected the sound part cannot be distinguished from the part which is diseased.

The dead buds fall off in consequence of the decomposition of the tissues. No trace of a fungus or of lesions produced by insects or animals is found on the diseased rhizome, while on the other hand the roots are spotted with the perithecia of a Perisporiacea in which the writer has recognised the *Zopfia rhizophila* Rabenh., discovered for the first time in Saxony on the roots of asparagus which has been heaped together; it had never before been found in Italy, so far as is known.

Mr. Farneti thinks that the fungus should be inscribed, for the moment at least, in the number of facultative fungi, and he intends to make some minute investigations into its biology.

For the control of the disease, it is necessary to pull up the diseased plants and burn them, and then disinfect the soil of the asparagus bed with bi-sulphide of carbon (200 gr. per sq. metre). If it should be desired to plant the apparently sound plants which have been pulled up from an infected soil they must first be well covered with powdered sulphur.

619 T. Johnson and J. Adams. **Bacterial Rot in Turnips and Other Brassicas in Ireland.** — (*Economic Proceedings of the Royal Dublin Society*, vol. XI, pp. 1-7, 1 pl. 1910). *Botanisches Centralblatt*, Bd. 116, n. 5, Jena, Jan. 31, 1911, p. 127.

Great Britain: Ireland

This article contains a concise report on the following bacterial diseases which have been discovered in Ireland.

1) « Brown Bot » of the turnip, due to *Pseudomonas campestris* Smith.

2) « Soft White Rot » of the turnip, caused by the *P. destructans* Potter.

3) « Soft Black Rot » of the cabbage caused by the *Bacillus Oleraceae* Harrison.

On comparing the characteristics of *P. destructans* and those of *B. Oleraceae*, the writers came to the conclusion that they were probably both the same organism.

620 A. Vigier. **The " Bulb Rot „ of the Lily.** (La « Pourriture des Bulbes » de Lis). — *Revue Horticole*, Paris, n. 23, Dec. 1, 1910, p. 544.

The causes of this rot are, or appear to be:

1) excessive moisture of the soil;

2) procuring of bulbs from regions where microbic or cryptogamic diseases are prevalent;

3) unfavourable conditions of importation.

A bulb which is partly attacked is not necessarily past remedy. The dry and damaged scales should be taken away, all the dead part removed, and the bulb then plunged into a cupric solution made as follows:

Boiled water 1 litres;

Copper sulphate 2 gr.;

Ammonia 5 to 10 gr. to re-dissolve the precipitate which is fotmed.

The bulb should be immersed for at least half an hour, and afterwards put to dry for eight days. When quite dry, it may be planted and will grow satisfactorily.

621 **Strawberry Leaf Spot (*Sphaerella Fragariae*, Tul.).** — *Board of Agriculture and Fisheries*, Leaflet No. 243. London, 1910.

France

Both cultivated and wild strawberries are often severely injured by a fungus called *Sphaerella Fragariae*, Tul. The foliage is the part attacked. Small reddish-brown spots appear on the leaves and tend to form patches. By degrees the centre of each patch assumes an ashy-grey or whitish colour. This pest is everywhere present in Britain, and is also well known on the Continent and in the United States. None of the cultivated varieties escape the disease, but some are more severely attacked than others. The variety called *Royal Sovereign* is especially susceptible to the disease.

The following method of combating the disease has proved highly satisfactory when strawberry beds are badly infected. The beds should be mown soon after the fruit is gathered, covering the dry leaves with a sprinkling of straw or dry litter and burning them. This may seem harsh treatment for the plants, but everyone who has tried burning over a strawberry bed has been surprised by the vigorous and healthy appearance of the new foliage.

K. Störmer. **The Fruit Tree " Pest „ and the " Leaf Curl „ of the Potato.** (Obstbaumsterben und Kartoffelblattrolkrankheit). — *Jahresbericht des Vereins für angew. Botanik*, 1909, Berlin, 1910, pp. 119-170, and xx-xxii, 15 figs). *Rivista di Patologia vegetale*, year IV, n. 17, pp. 259-260, Pavia, n. 30, 1919. **622**

Germany

The study of the cherry, pear, and gooseberry « pest », and that of the « leaf curl » of the potato, has led to the establishment, according to M. Stormer, of the fact that the two diseases have similer symptoms, that the original cause of them lies in the soil and that they have also a similar biological cause.

The infection begins at the roots, through the intervention of bacteria which first of all invade the interior of the plants without injuring them, but may become pathogenic afterwards.

Mr. Störmer describes for the first time *Coniothecium Ribis*, which may also act as a pathogenic agent for the gooseberry. He speaks next of the secondary infection due to some fungus: *Valsa leucostoma* for the cherry tree, a similar fungus for the pear tree, *Botrytis Ribis* n. sp. for the gooseberry, and *Fusarium*, *Verticillium alboatrum*, *Phoma*, etc., for potatoes.

The biological causes of the above mentioned diseases being similar, the methods for controlling them should also be the same: selection of resistant varieties, cultivation, manuring and disinfection of the soil, and protection against frost.

G. G. Hedgcock. **Field Studies of the Crown Gall of Grape Vines.** (*U. S. Dept. of Agr., Bur. of Plant Indus.*, Bull. 183, p. 40, pls. 4). — *Experiment Station Record*, No. 7, p. 650. Washington, Dec. 1910. **623**

United States

The results are reported of several years' investigations of the « Crown Gall » of the grape in the western part of the United States, and especially of the susceptibility or immunity to the disease of the most important varieties of grapes. The writer also discusses the distribution and importance of crown gall, its two forms (root and cane galls) its development, effects, cause, cure and prevention, and gives an extensive bibliography of the subject. Two factors enter into the problem of the susceptibility or resistance of various species and varieties of grapes to this disease: the resistance to frost and the chemical constituents of the sap. *Concord*, *Catawba* *Delaware* and other American varieties are perfectly hardy and usually free from the disease, while varieties of *Vitis vinifera* are seriously injuried by freezing and hoar-frosts and become badly diseased. The sap of the resistant vines is especially acid to the taste. The varieties *V. cordifolia* and *V. Linsecomii* are susceptible, while varieties of *V. rupestris* and *V. vulpina* are quite resistant.

The cause of the disease seems to be *Bacterium tumefaciens*, which produces similar galls on a variety of plants. The crown gall is a communicable disease and usually attacks the vine through wounds from frost, pruning, insects, etc. Its prevention is mainly a matter of growing resistant varieties or grafting non-resistant scions on resistant stocks.

All diseased vines, should be dug up and burned as soon as discovered. Fungicides gave negative results.

624 G. Provost-Dumarchais. **Copper Salts and Vine Mildew.** Cuivre et « Mildiou ». — *Journal d'Agriculture pratique*, n. 49, p. 722, Dec. 8, 1910.

France

The ravages done by « mildew » in the vineyards in 1910 are not to be explained by the inefficacy of the copper, nor by its adulteration, nor by delay in the treatment, but by the *state of complele receptivity* of the vine. The latter, in fact, suffered all through the year; its roots, asphyxiated by the dampness of the soil, could not perform their functions, the sap did not circulate freely, and the sudden variations of temperature affected it greatly. All the conditions, on the contrary, were favourable to the « mildew ».

It has been found, that considerable good has been done by the use of sulphur containing powdered copper sulphate. The sulphur which is the specific for Oidium, acted in this case against the mildew by « reviving the vigour of the vine », and fortifying it. M. Mares has a long time ago demonstrated the beneficial rinvigorating action of sulphur. In 1911, there fore, mildew should be controlled by cupric mixtures without neglecting dusting with flowers of sulphur.

625 G. Lafforgue. **" Mildew ", the Cochylis and the Eudemis in the Gironde in 1910.** (Le « Mildiou », la Cochylis et l'Eudémis dans la Gironde en 1910). — *Progrès agricole et viticole*, Montpellier, n. 4, pp. 101-108, 22 Jean, 1911.

France

Mr. Lafforgue, having found certain plots in the vineyards. in 1910, where the crop was perfectly preserved, in the midst of other plots where the vines were leafless and without fruit, set to work to discover, bx a minute personal inquiry, the reason for this partial success, in order that a lesson might be learned from the fact.

In regard to « mildew », he affirms that the date and execution of the treatments are the most important points. Putting aside the influence of the vine-stook and the soil on the efficacy of the treatments, he thinks the following conclusions may be drawn from the investigations made.

1. The salts of copper, in their various forms, are efficacious against « mildew », but the dose must be sufficiently large and never below 2 °/₀ in Bordeaux or Burgundian Mixtures. These must always be either neutral or slightly acid.

2. The treatments must be made early, as preventatives, and care must be taken to realise the *opportune moment.* This moment *would appear* to coincide with a depression in the growth of the vine and a high hygrometric condition of the atmosphere.

3. The applications should be thorough each time, that is to say, all the green organs which have never been covered with the mixture, or have become uncovered, should be treated.

4. It is indispensable that all the appliances be ready, so that the work may be done as rapidly as possible, in order that the treatment may be carried out during the proper period without the work suffering by haste.

5. Generally speaking, during very wet years, the two first treatments should be completed by the application of cupric powders.

6. Lastly, the vine branches should be lifted early, and fastened, not in bundles, but in such a way that the lower parts and the whole of the foliage may be treated with ease.

In segard to Cochylis and Eudemis, Mr. Lafforgue thinks they may be controlled, on the conditions;

1. That the winter treatments are carried out on a larger scale (stripping, scalding, white washing, etc.).

2. That the right moment is chosen i. e. when the moths appear;

3. That a slight stripping of the leaves be made before the first treatment;

4. That the treatments be made as general as possible, so that the control may be made at the same time over a very extended area.

The new remedies, containing di-sulphide of carbon, proposed in 1910, seem to be worth consideration. They should tested comparatively with the others.

G. G. Hedgcock. **Field Studies of the "Crown Gall„ and "Hairy Root„ of the Apple Tree,** — *U. S. Dept. of Agriculture Bur. of Plant Industry, Bull. n. 186*, pp. 2-108, Washington, Nov. 7, 1910, **626**

United States

The « Hairy Root » and « Crown Gall », both cases of hypertrophy of the stem and roots of various plants, are due to the same cause; but they must be treated differently.

The « Crown Gall » is found under two forms; *hard* and *soft*; the latter is characterised by more rapid growth, with the formation of loose tissues. It attacks the young plants in nurseries by preference, as well as graft plants at the moment of the formation of the callus.

Heavy soils favour the spread of the disease, but the contrary is the case with « Hairy Root », which is more generally found in a loose light soil.

The following forms have been described:

a) The simple form: numerous roots which grow at right angles from the radical axis.

b) « Woolly-Knot », groups of roots which start from a swelling or knot.

c) « Broom-Root », roots which present the phenomena of true *swaddling* and are sometimes negatively *geotropic*.

d) Tumours or knots, which form on the parts of the plant above ground.

The degree of resistance of the species attacked increases with age. The best grafting material is furnished by the American species of apple, which are less sensitive to the attacks of these diseases.

Amongst the most known commercial varieties, the « Wealthy », « Yellow transparent » and « Wolf River » were the most affected by « Crown Gall », while « Ben Davis », and « Northern Spy » suffered greatly from « Hairy Root ».

The following precautions should be rigorously observed:

1) Up-rooting and burning the infected plants.

2) Securing sound material, both for grafting and for nurseries.

3) Making the grafts on the roots at a depth of 8 to 11 cm., and taking care that the contact surfaces are clean and adherent.

4) The graft and the root should be approximately of the same diameter.

5) Avoiding any injury to the young plants which would expose them to infection.

6) Choosing loose, light and dry soils.

The rigorous application of these remedies has given the most satisfactory results possible, not only for apple trees, but also for other fruit trees most susceptible to infection.

627 Dan. H. Jones. **Fire Blight Successfully Combated.** — The Farmers' Advocate, vol. XIV, n. 949, pp. 1888-1889, London, Ontario, Dec. 1910.

Canada: Ontario *Bacillus amylovorus* attacks pear and apple trees, causing the buds to dry up and gangrenous spots to form on the trunk. The disease is mainly spread by insects: *Aphis Mali, Schizoneura lanigera,* which suck the juice of the young tissues, and *Scolytus rugulosus*, which carries the germs inside the bark, hollowing out long galleries. This insect may be destroyed almost completely by burning fallen branches and the parts of the trunk where it has taken refuge during the winter. As to the aphides, good results are obtained by watering the buds infested by their eggs with disulphide of carbon, and a large number of the adults can be killed in summer by applications of kerosene.

W. M. Scott and A. L. Quaintance. **Control of the Brown Rot and Plum Curculio on Peaches.** — *U. B. Dept. of Agric. Bur. of Entomology*, Circular n. 100, pp. 3-7, Washington, March 12, 1911. **628**

United Stated

A fungus — the *Sclerotinia fructigena* (Pers.) Schröt. — and an insect — *Conotrachelus nenuphar* Herbst — are doing a great deal of harm to the peaches in the southern zone of the United States. The first attacks the still green fruit, and causes the appearance of spots of necrosis which, continually enlarging, end by covering the entire fruit.

The females of *Conotrachelus* pierce the skin when they are going to lay their eggs, and a favourable substratum is formed at the injured point for the development of the spores of the fungus, the spread of which they thus encourage.

As a remedy against this evil, the use of a mixture of sulphide of calcium and arseniate of lead is recommended, as it acts against both the insects and the fungi.

Three applications are as a rule sufficient; the first when the calyces of the young fruit fall (2 lbs of arseniate in 50 gallons of sulphide of calcium); the second a month after the fall of the petals, and the third some weeks before the fruit is gathered.

Medlar Tree "Blight," *Gymnosporangium Sabinae* Dicks. See No. 686 in this Bulletin. **629**

R. Laubet. **"Banana Rot."** (Die *Gloeosporium* Faule der Banane und die *Gloeosporium* - und *Phyllosticta* - Blattfleckenkrankheit des Efeus - *Gartenflora*, LIX, pp, 409-415, 1910). — *Botanisches Centralblatt*, Bd. 115, No. 5, pp. 127-128, Jena, Jan. 31, 1911. **630**

Germany

Mr. Laubert remarks that frequently in the large consignments of bananas which are now being made, long, deep, black spots are seen on the fruit, which are often similar to bands; these spots are caused by *Gloeosporium Musarum* Cke. and Mass., or perhaps, he thinks, by a particular form of this species which may be distinguished under the name of ***importatum***. This *Gloeosporium* causes a special "rot," which is frequently found in bananas that are sold cheap. To check the disease, all bruising, squeezing or other bad treatment of the bananas, should be most carefully avoided during transport.

631 D. FROMBLING. **On the Relationship of Certain Coniferous Diseases to the Original Source of the Seed.** — (*Forstw. Centralblatt*, n. ser. 32, 1910, N. 4, pp. 193-200). *Experiment Station Record*, N. 7, p. 652. Washington, Dec. 1910.

United States

The writer discusses the probable relationship that may exist between the outbreak of certain coniferous diseases, such as larch canker (*Peziza Willkommii*) spruce scab (*Hysterium macrosporum*) and needle cast (*Lophodermium pinastri*) (1) and the source from which the original seed came.

As large quantities of such seeds come from countries, or localities, with different climatic and soil environments from those in which they are afterwards sown, it is probable that under these new conditions, trees from such seed will be more susceptible to serious epidemics.

632 E. MUNCH and C. von TUBEUF. **A New Disease of the Needles of the *Pinus Sylvestris*.** (Eine neue Nadelkrankheit der Kiefer, *Pinus Sylvestris*). — *Naturwissenschaftliche Zeitschrift für Forst- und Landwirtschaft*, 9 Jahrg, Heft 1, pp. 20-25, Jan. 1911.

Germany

This is a description of a disease of the Scotch Pine which has recently made its appearance in various localities of Germany, the cause of which is a fungus, *Hendersonia acicola*.

The extremity of the leaf turns brown, and it is separated from the still sound basal part by an intermediary zone which is made transparent by the resin accumulated there·

If these diseased leaves are put into a warm moist atmosphere, numerous little heaps of conical black excrescences will be found to have appeared on the surface at the end of 3 or 4 days. No perithecia have as yet been discovered.

633 K. BANCROFT. **A Pine Disease, *Diplodia Pinea* Kickx.** — *Royal Botanical Gardens, Kew. Bulletin of Miscellaneous Information*, No. 1, pp. 60-62, London, 1911.

Great Britain: England

From 1903 to 1906, in different parts of England, it was found that several species of *Pinus* were diseased. Massee undertook an artificial cultivation, and his researches showed that the cause of the disease was a fungus, *Diplodia pinea* Kickx, already observed in France, Belgium and Italy. Later on, in 1910, the same fungus was found on the diseased branches of *Pinus insignis* and *P. montana* from Cape Colony.

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(1) See N. 494 in this *Bulletin*.

The disease caused by this fungus only attacks the terminal portion of the shoots, the leaves turn yellow, then fall, and the death of the part affected ensues.

Some experiments have been made at Kew on *Pinus sylvestris*, *P. Strobus*, *P*, *insignis*, *P. Pinaster*, *P. montana*, *Picea excelsa*, *Abies pectinata* and *Larix europaea*, with the object of determining the way in which the fungus penetrates the tissues of the plant, and the variety of its hosts.

The following are the most important conclusions which have been drawn:

1) The species of *Picea*, *Abies* and *Larix* appear to resist the disease;

2) It is not possible to infect the different kinds of Pinus except when laceration or wounds occur in their tissues.

The diseased parts should be cut off immediately and destroyed. This direct method of checking the parasite, however, can only be applied in forests to a very limited extent.

In districts where the disease is known to occur it is advisable to avoid cultivating large areas with species of *Pinus;* the disease would be more easily kept under control by practising a mixed cultivation.

It should be borne in mind that a close aggregation or large numbers of plants of the same kind, favours the development and spread of an epidemic.

The *Botrytis Douglasii*, injurious to the Douglas Fir. See No. 495 in this Bulletin. **634**

G. Briosi and R. Farneti. **The Ink Disease of the Chestnut.** (Sulla moria dei castagni. Mal dell'inchiostro). — *Atti dell'Istituto Botanico dell'Università di Pavia*, Serie II, vol. XIII, pp. 291-298, Tav. VII (Prima nota) e vol. XIV, pp. 47-51 (Seconda nota preliminare). **635**

Italy: Tuscany Piedmont

The writers publish the initial results of their studies on the "Ink disease" of the chestnut ("moria" or "male dell'inchiostro" in Italian, "Schwarzwerden" or "Tintenkrankheit" in German), as well as on the curative and prophylactic methods to be applied. In spite of the numerous investigations which have already been made on the subject in Italy and abroad the cause of this malady is still unknown.

Messrs Briosi and Farneti found a fungus, in the chestnut groves of Tuscany where the disease had broken out, which they describe as a new species under the name of *Coryneum perniciosum* and consider it as the primary cause of the disease.

They are also of opinion that the infection does not come from the root as is usually believed, but from the upper part of the tree, and that the disease spreads to the roots following a centrifugal path. This being the case, the preventive and curative methods should be as follows. As soon as the first symptoms of the disease appear in a copse, the trunk shoots should be pruned off immediately, at the base and very low down, beneath the first brown marking; the parts lopped off should be taken from the grove and burned. The wounds left by the pruning should be coated with mastic.

In regard to the trees cultivated for their fruit the writers think that the same method might be used, although they do not possess as yet any data sufficiently precise to enable them to establish the origin of the disease. They think, that in groves of full grown trees, the infection is produced by the suckers which grow at the foot of the trees, and present characteristics similar to those which grow in copses; the fungus attacks them, and from the foot of the tree it descends into the roots. It is therefore necessary, as soon as the symptoms of the disease show themselves, to cut the shoots off every year almost level with the stem, to burn the parts cut off and to cover the wounds.

In the case that the disease should already have spread into the stock, the parts of the bark or wood which are affected by the disease must be cut away, and the wounds disinfected with a concentrated solution of ferrous sulphate, with the addition, if necessary, of sulphuric acid, and afterwards coated with mastic, as suggested for the copses.

In the second preliminary note the writers give a summary of the results of further investigations concerning the "ink disease" which they have been examining in the chestnut groves of the territories of Pinerolo, Pontremoli and Savona. Here the disease presents the same characteristics of cryptogamic infection as those found by the writers in the chestnut groves of Tuscany.

According to the results of investigations, the disease appears to begin by attacking the youngest branches, and is often favoured by the wounds produced by insects or other causes. In the forests of full grown trees, the infection is generally produced on the high branches, while in the shoots of the stumps in copses the cankerous depressions common in this disease are usually formed at the foot of the tree, and also frequently up to the height of 2 or 3 metres. The writers have found, in addition to the *C. perniciosum*, which is the conidian form of the fungus, the picnid form also, which they describe and name *Fusicoccum perniciosum* n. sp., and the form with perithecia (*Melanconis perniciosa* n. sp.).

As a remedy, they advise the immediate and complete removal to a safe distance of the affected parts, which should be burned. The disinfection of the cut surfaces is also advised by one of the following solutions:

1) A saturated solution of copper sulphate;
2) A solution of tannate of protoxide of iron;
3) An acid solution of ferrous sulphate (4 to 5 kg.), to which a decilitre of sulphuric acid at 56° B. should be slowly added.

The whole is diluted in 10 litres of boiling water, and thoroughly mixed.

636 T. Petch. **Root Disease of *Acacia decurrens*.** — (*Circular and Agricultural Journal of the Roy. Bot. Gardens Ceylon*, vol. V, No. 10, pp. 89-94, tab. X-XII). *Annales mycologici*, vol. IX, No. 1, p. 129. Berlin, Feb. 1911.

Ceylon

Mr. Petch deals with *Armillaria fuscipes* Petch and *Fomes australis*, which destroy the roots of *Acacia decurrens* (1), which is usually unaffected by parasitic fungi.

He remarks that the *A. fuscipes* is very similar in aspect to the analogous European species *A. mellea*.

637 P. Petch **Brown Root Disease, *Hymenochae noxia*, Berk**. *Circular and Agric Journal of the Royal Bot Gardens Ceylon;* vol., No. 6, 1910, pp. 47-54, tab. V-VII). — *Annales mycologici*, vol. IX, No. 1, p. 129. Berlin, Feb. 1911.

Ceylon

Hymenochaete noxia Berk. is with *Fomus semitostus*, one of the most frequent noxious Basidiomycetes in Ceylon. This fungus causes the "Brown Root Disease" in various plants, and especially in the *Hevea*; the disease attacks the roots only, and necrosis sets in under its action. Contrary to *F. semitostus*, the *H. noxia* is propagated very slowly.

Mr. Petch afterwards touches briefly on *H. rigidula* B. and C. which also causes havoc in Ceylon.

638 T. Petch. **A Root Disease of Hevea, due to *Sphaerostilbe repens* B. and Br**. (*Circular and Agric Journal of the Royal Bot. Gardens*, Ceylon, vol. V, No. 8, 1910, pp. 65-75, tab. VIII-IX). — *Annales mycologici*, vol. IX, No. 1, p. 129. Berlin, Feb. 1911.

Ceylon

Sphaerostilbe repens B. and Br. which is met with in various districts of Ceylon, is sometimes very injurious and even kills the tree which it attacks.

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(1) The *Acacia decurrens* Willd., Australian Leguminosa, has a bark which is very rich in tannin; the plant is greatly esteemed, under the name of "Green Wattle," in the tanning industry, as well as other species of the same genus, especially *A. picnantha* Benth., or "Golden Wattle," and *A. mollissima* Willd. (= *A. decurrens* var. *mollis* Lindl.) or "Black Wattle." Cf. Bailly, *Cycl. of Amer. Hor.*, vol. I, New York, 1909, p. 5.

Its mycelium is developed on the roots of the *Hevea*, below the bark, in the form of long flattened cords which turn from red to black. By these characteristics the mycelium of *S. repens* can be distinguished from those of other fungi which damage the roots of other plants.

639 ***Eutypa caulivora*** **on Para Rubber Trees.** — *Deptm. of Agric., Trinidad Bulletin*, Vol. IX, N. 66, p. 234. Port-of-Spain, 1910.

Trinidad

This fungus is an undescribed species of *Eutypa* and has been called *E. caulivora* by George Massee.

It is probably a true parasite, judging from what is known respecting other species of *Eutypa*. These fungi persistently remain in a vegetative — and thus aggressive — condition so long as their host remains alive, and only come to the surface to produce fruit, when the host is absolutely dead. The mycelium of the fungus produces numerous black streaks deep in the wood, the whole of which, in all probability, it permeates.

Phanerogamous Parasites and Weeds. — Their Control.

640 **The Evils of Farm Weeds.** — *The Farmer's Advocate*, vol. XLV, No. 949, p. 1890. London, Ontario, Dec. 1, 1910.

Canada

According to G. H. Clark, Seeds Inspector, if the fields were cleared from weeds, the production of cereals and grass crops would increase by 10°/$_0$ at least in the district of Ontario.

The seeds of weeds, also, which are as a rule very indigestible and are sometimes poisonous, get mixed with the oil cake and fodders, and have an injurious effect on the production of meat and milk.

641 DELGOVE and FOEX. **Rice Field Weeds.** See No. 675 in this Bulletin.

Madagascar

642 WÜST. ***Orobanche elatior*** **Sutt. on Red Clover,** ***Trifolium pratense.*** (Die hohe Sommerwurz, Orobanche elatior Sutt. auf *Trifolium pratense*). — *Praktische Blatter fur Pflanzenbau und Pflanzenschutz*, IX J., Heft 1-2, pp. 29-30. Stuttgart, Jan.-Feb. 1911.

Germany: Wurttembrrg

Mr. Wüst deals with the recent appearance of *Orobanche elatior* Sutt. on three different fields sown with *Trifolium pratense*, which this parasite has invaded and seriously damaged within the space of a few weeks.

He is of opinion that if the infection can be attributed in part to the neighbourhood of plants of *Centaurea scabiosa*, which is the ordinary host of this parasite, it is due more particularly to the impurity of the clover seeds.

A. MAUBLANC. **Phanerogams which are Injurious to the Sugar Cane.** See No. 613 in this Bulletin. 643

Insects and other noxious Invertebrates: Their Biology and Control.

P. NOEL. **Natural History and the Floods in 1909 in France.** — *Bull. du Laboratoire régional d'Entomologie agricole*, First three months of 1911 (Jan.-Feb.-March), pp. 3-4. Rouen, 1911. 644

France

The floods of last year, due to deforestation, considerably disturbed the peaceful existence of a large number of animals. In the insect world the havoc was tremendous. Certain butterflies which are common every year were very scarce in 1910: *Vanessa Cardui*, the Bindweed Sphinx, the Lichnia, the Elder-tree Moth, the Currant moth appeared only in very limited numbers.

Certain families of plant-lice were not seen at all; the ant and bee swarms were very poor, and the wasp seems to have disappeared.

There was an invasion of rats (*Mus decumanus*) in all the high quarters of the towns situated on the banks of the Seine; those who escaped made a desperate attack on the black rat (*Mus rattus*) and the species seems to have completely disappeared from the environs of Rouen.

The year 1910 was very prejudicial to stone and pip fruit, but it was particularly unfavourable to the berries and seeds (Mountain ashes, Hazeltrees, Sloes, Privet, Oak and Hawthorn), which are so sought after in autumn by squirrels and birds.

H. O. MARSH. **Biological Notes on Species of *Diabrotica* in Southern Texas.** — *U. S. Dept. of Agric. Bur. of Entomology*, Bull. No. 82, Part IV, pp. 76-84. Washington, Dec. 9, 1910. 645

United States: Texas

Some species of the genus *Diabrotica*, which is very common in Texas, are causing serious havoc in market gardens.

The adult insects attack Beans, Cucumbers, Melons and Asparagus; the larvae devour the young tissues of Maize and Sorghum.

As a remedy sprayings of arseniate of lead are recommended.

646 A. Busck. **List of Trinidad Microlepidoptera.** — *Dept. of Agric. Trinidad; Bull.*, vol. IX, No. 66, pp. 241-245. Port of Spain, Oct. 1910.

The following is a list of the Microlepidoptera of Trinidad known up to the present:

GELECHIDAE.

Trinidad

1) *Aristotelia rubidella* Clemens.
2) *Epithectis (Aristotelia) eromene* Walsingham.
3) *Lipatia crotabariella* Busck n. gen. n. sp.
4) *Anacampis episema* Walsingham.
5) *Gelechia bosquella* Chambers.
6) *Dichomeris (Ypsolophus) stratella* Walsingham.
7) *Dichomeris (Ypsolophus) indigna* Walsingham.
8) *Glyphidocera caribbea* Busck n. sp.

STENOMIDAE.

9) *Stenoma (Antaeotriche) griseana* Fabricius.
10) *Stenoma (Antaeotriche) tibialis* Zeller.
11) *Stenoma (Anadasmus) immunda* Zeller.
12) *Stenoma albana* Fabricius.
13) *Gonioterma isabella* F. and R.

SESIIDAE.

14) *Sesia Theobromae* Busck n. sp.
15) *Heliodines Urichi* Busck n. sp.
16) *Atteva punctella* Cramer.

HEMEROPHILIDAE.

17) *Glyphipterix (Ussara) repandana* Walker (n. syn. *paradisea* Walsingham).
18) *Brenthia pavoncella* Cleme.
19) *Hemerophila albertiana* Cramer.

TINEIDAE.

20) *Leucophasma carmodiella* Busck.
21) *Opostega trinidadensis* Busck n. sp.

22) *Tineola uterella* Walsingham.
23) *Ereunetis minuscola* Walsingham.
24) *Setomorpha rutella* Zeller.
25) *Tiquadra lentiginosa* Zeller.

Mr. Busck gives description of the new species.

J. Feytaud. **Geographical Area in Europe of the Cochylis and Eudemis.** — *Revue de Viticulture*, No· 894, pp. 114-115, Paris, Febr. 2, 1911. **467**

There is a very sharp difference betwcen the Cochylis and the Eudemis from the point of view of climatic preferences in relation to a diffeıence of origin.

France. Germany. Italy. etc.

The Cochylis is an insect of the north, liking fresh unsheltered vineyards, and developing particularly during cold and wet years. The Eudemis, on the contrary, is a southern insect, with a preference for warm vineyards, to which warm and dry years are particularly faaourable. But the Eudemis has a great faculty of adaptation which allows it to extend its geographical area very rapidly· It has particularly adapted itself to the Gironde, Beaujolais, the vineyards of the Moselle and Palatinate; the Cochylis has had tc give up its place to it.

The Eudemis is slowly supplanting the Cochylis, and the latter, only recovers during very wet years, as in 1910.

The geographical area of the Cochylis is very vast, the vineyards of Württemberg, the Palatinate, the Grand Duchy of Baden, the Rhine and the Moselle; the Lakes of Constance and Geneva; in Austria, Hungary, the Crimea and Northern Italy. In France, it has given way before the Eudemis.

The origin of the Eudemis appears to be Austria, whence it has spread to Italy, Greece, France and Germany and tends to spread more and more every year. Measures for controlling this insect, which is a veritable pest in vineyards become a necessity.

P. M. A. ***Maerophya*, a Sawfly injurious to the Vine.** — *Revue de Viticulture*, Paris, No. 891, pp. 48-49, Jan. 12, 1911. **648**

France: Libournais

In the vineyards of the Libournais, some vine shoots have been observed which contain a larva in their pith. The data on the havoc that may be caused by the larvae of these Hymenoptera are so far not well known. Laboulbene had observed in vine canes a larva of Tenthredinidae which he called *Maerophya strigosa* (*M, rufipes*); it excavates the pith of the dry canes left from the pruning, but also soon passes from the dry parts to the living plant and attacks the bud. The writer has not been able to identify the larva in question with the *M. strigosa*, the description of which has not been given. New investigations are necessary and the writer is going to breed the insect, in order to throw light on the question.

649 LEWIS H. GOUGH. **Notes on the Biology of the Froghopper (*Tomaspis postica*, Cercopidae).** *Depart. of Agric., Trinidad Bull.*, Vol. IX, N. 66, pp. 174-176. Port-of-Spain, Oct. 1910 (1).

Trinidad

There has hitherto been some doubt concerning the place where the eggs of the froghoppers are laid. It has been asserted that they are laid in the earth, or on the roots, or on the leaves of the sugar-cane.

The writer has been successful in obtaining eggs both in experimental cages and in the field. They are not deposited in the ground, but in slits made in the tissue of the leaf sheaths (or of the leaves near their bases) nearest to the ground. The eggs are yellow, measuring about 3-100th of an inch by 1-100th (0,75 mm. × 0,25 mm.).

Although the larvae usually live on the roots near the surface or deep under the cane stool, it has been found possible to rear them to maturity on the stems and leaves of grasses. They were found in similar positions in the field. The adults emerge without having undergone any period of quiescence. The "froth" in which they are enclosed is quite stiff and dry when they emerge. In the field the sexes are present in approximately equal numbers. Both sexes are readily attracted by light, and their attraction has been used as a means of exterminating them. But the females, being more sedentary than the males, do not get caught by traplight to the same extent.

Knowing now where the eggs are to be found, application of some insecticide (e. g. tobacco juice) as a spray should be of great use. The proper time for the application would be soon after the first flight of adult froghoppers is observed.

(1) See this Bulletin, No. 2, Dec. 1910, pp. 379-389, No. 1, January 1911, p. 234-235.

650 JAMES BIRCH ROPER. **The Green Muscardine of Froghoppers.** — *Reprinted from the Proceedings of the Agricultural Society of Trinitad and Tobaco*, vol. X, pp. 467-482. — (*Society Paper*, No. 442). Port of Spain, December 10, 1910.

Trinidad. Tobago

The "Sugar-Cane Blight" in Trinidad is often found associated with "Root Disease," Leaf Spot" and "Red Rot," but the fact that it occurs also in typical form apart from these fungus diseases, shows that it is distinct.

As the frog-hopper is always associated with the blight, and its attack causes the symptoms of the latter, it seems reasonable to suppose that this insect is the cause of the malady.

In 1890, Hart observed for the first time, that adult froghoppers were attacked at times by a parasitic fungus; in 1906, Urich stated, that on Orange Grove Estate, a large percentage of the insects fell victims to its attack.

Specimens and cultures of the fungus were sent to Harvard University, where Dr. R. Thaxter determined it as *Metarrhizum anisopliae*, Sorokin. It is of wide distribution, and attacks a variety of different insects.

It grows on various media, but best on starchy substrata, such as white potato cylinders, and rice.

When sown in potato agar, the spores germinate in 4 to 6 hours generally with one, but at times two, germ tubes near the ends.

The hyphae soon branch and become septate.

The sporophores are grouped together forming short stalks, and the spores are cut off from the ends of the hyphae in long chains which adhere together in cylindrical, cube-like, or slightly fan-shaped masses. The individual sporophores are simple, branched slightly or in a verticillate manner.

The fungus attacks not only adults, but also nymphs.

Spores which fall in the spittle surrounding the latter, germinate there, and the hyphae soon penetrate the soft body.

On the perfect insects, the necessary moisture for spore germination is furnished by rain or dew.

The mycelium grows very rapidly, and fills up the whole body-cavity.

The attacked insects do not fall to the ground, but are fastened to the leaves by means of the mycelium which, when the victim is dead, penetrates to the surface through the spaces between the body segments. These mycelial masses soon become confluent, and the whole insect is covered with a green powder formed of spores which are thus easily distributed.

In 1880, Metschnikoff suggested the possibility of using the fungus in combating the cockchafer of wheat (*Anisophia austriaca*).

The writer has made a number of inoculation experiments on adult and nymph froghoppers.

Twenty ccs of water were poured into a tube containing a fruiting culture of the fungus. The tube was shaken, so as to wet the spores, and the latter were suspended in the water. This liquid was sprayed on to the froghoppers in a cage.

The results of the inoculation were most successful.

An experiment was also made in the open field.

Two oz. of flour were placed in 6 flasks containing cultures one month old, and this mixture was sprayed over 100 plants.

In the inoculated area, 50 °/₀ more dead froghoppers were found than in the rest of the field, and every dead insect is a fertile soure of infection. The most essential point in favour of the use of the fungus, is the fact that the froghoppers are more active during the rainy season, which is the best time for the growth of the green Muscardine.

651 E. W. BERGER. **White Fly Control.** — *University of Florida. Agr. Exp. St. Bull.* 103, pp. 5-28. De Land, Sept. 1910.

The white fly attacks plantations of citrus trees in many districts of Florida.

United States: Florida

There are three ways of combating this insect, by fumigation, spraying with insecticides, and by the extensive cultivation of certain fungi, which, like the following, attack and destroy its larvae: *Aschersonia flava-citrina, A. aleyrodis*, *Aegerita Webberi*, Fawcett, *Verticillinm heterocladum* and *Microcera* sp.

Of these, without doubt, *Aschersonia aleyrodis* is the most important, and gives satisfactory results where the trees are in good condition and the summer rains are normal.

The best time for spreading this fungus, is when the weather is hot and damp, and when the young larvae collect in large numbers on the leaves.

The results of repeated experiments made by Mr. F. Stirling, in and near De Land, have been very satisfactory.

652 M. K. SCHESTIRIKOV. ***Oscinis frit*, L. in Russia.** (K. biologhii Schwedskoi Mukhi).—*Isviestiia Moskowskago Selskokosiaistvennago Instituta.* (*Annals of the Agricultural Institute of Moscow*), God. XVI, Kniga 3, pp. 207-228. Moskva, 1910.

Russia

In S. Russia, *Oscinis frit* only produces three generations in the year:

1) *Winter generation.*—The females lay their eggs on the surface of the leaves of cereals, and on emerging, the larvae cross the leaves which surround the apex of the stem, and penetrate into the interior of the stem which they devour, attacking even the inflorescences, when they begin to differentiate.

2) *Spring generation.*—The females migrate in May, from the winter to the spring cereals which they destroy in the usual manner.

3) *Summer generation.*—The eggs are laid on oats, barley, and also on the wild graminaceae: *Bromus Poa*, *Triticum repens*, *Phleum pratense*, *Alopecurus pratensis*, *Milium effusum.* The damage done largely depends on metereological conditions.

A cold spring retards the development of the insects, and the females deposit their eggs in the ears, while the caryopses are still soft and milky, instead of upon the leaves or haulms. If the season is warm, the development of the insect is much accelerated, and the eggs are laid upon young plants which have not yet flowered, but which furnish the larvae with plenty of green, soft tissue.

The data of the geographical distribution of this pest in Russia, are, so far, very incomplete. But, taking as the extreme points Courland, the district of the Volga, Bessarabia, and the Caucasus, the result is a square which includes nearly all European Russia.

The havoc wrought by the *Oscinis* amounts, in some cases, to 70 °/₀ or even 90 °/₀; but varies, as a rule, between 20 °/₀ and 50 °/₀. Summer droughts and winter frosts have little effect upon it, but its natural enemies play a large part in the destruction of the insect. Swallows destroy great quantities daily.

A small hymenopteron, *Pteromalus micans* deposits its eggs beneath the epidermis of the larvae of the *Oscinis* which are killed by the grubs when they hatch out.

Miris delobratus attacks the chrysalids, and some Coccinellidae destroy the larvae.

Some hitherto unclassified entomophagous fungi kill considerable numbers of the pest, and might be employed in combating it.

The following measures are to be advised:

1) Choice of early varieties. Abundant use of nitrogenous fertilizers in the spring. Well developed plants are, as has been observed, much less liable to attack.

2) The destruction of all wild graminaceae in the field, as these often serve as places where the summer females can lay their eggs.

3) Treatment of the grain, before sowing, with a solution of carbon disulphide or formalin.

4) Sowing spring cereals at some interval after winter ones, and planting catch crops in between.

F. WATTS. **Scale Insects and their Natural Enemies.** — *Reports on Botanic Station Experiment Plots and Agric. School*, p. 15. Dominica, 1909-1910. **653**

Leeward Islands: Dominica

The enemies of the Coccidae have been the object of special attention lately at Dominica.

The following insect-foes have been observed, two species of lady-birds and a lace-wing fly. It has also been frequently noticed that colonies of scale-insects have been attacked by a spider or mite.

The following fungus parasites are present: *Sphaerostilbe coccophila* (red-headed fungus), *Cephalosporium lecanii* (shield-scale fungus), *Ophionectria coccicola* (white-headed fungus), and *Myrangium Duriaei* (black-fungus).

During the last year, these natural enemies have kept the spread of scale-insects quite under control, and every encouragement should be given to these useful parasites.

In order to make them better known, mounted specimens have been sent to planters.

Quantities of scale-insects badly affected by these fungi have been despatched to other islands, where the presence of the latter has not been recorded.

654 A. G. HAMMAR. **Life History of the Codling Moth in North Western Pennsylvania.** — *U. S. Dept of Agriculture Bureau of Entomology*, Bull. No. 80, Part VI, Nov. 26th 1910.

United States: Pensylvania

The codling-moth larvae remain while young within the fruit, at the time of maturity however, they leave the latter and seek suitable places for metamorphosis or hibernation. They are then exposed for a short time, and are sometimes attacked by various insect enemies, e. g.

Coleoptera: Tenebroides corticalis Melsh., *Dromius piceus* Dej, *Galerita Janus* Fab.

Ants: Camponotus pennsylvanicus (Dej) Mayr.

Formica subsericea Say.

Cremastogaster lineolata Say and *Myrmica lobicornis* Nyl.

In the control of the pest by means of spraying with insecticide, three applications should be made. The first, just after the petals drop, the second 8 or 10 days later, and the third about Aug. 1st.

655 **Aphides or Plant Lice.** — *The Journal of the Board of Agriculture*, Vol. XVII, N. 10, pp. 823-829. London, Jan 1911.

Great Britain

Aphides damage plants in two ways: 1) by sucking away the sap and so weakening them, and 2) by their excrement falling on the leaves and clogging the stomata, and thus interfering with the gaseous interchange. Further, the excrement consisting partly of "honey-dew" is a favourable germinating medium for some fungi.

Three species of Aphides are described. *Aphis Rumicis* L., *Aphis Brassicae* L. and *A. pruni* Réamur. These attack beans, cabbages, and plum-trees and other rosaceae respectively.

Several insects prey upon these pests. *Coccinellidae*, (both in the larval and adult state) also the larvae of *Syrphidae* and *Chrysopidae*, while various hymenopterous parasites (*Chalcididae*) lay their eggs in the bodies of Aphides, and thus destroy them.

The services of these auxiliaries are not sufficient to keep the plant-lice in check, washes should be used, and the infested parts cut off and burnt. Soft-soap and quassia make a very good spray.

656 L. O. HOWARD. **Importations of Insect Enemies of the Gipsy Moth and the Brown-Tail Moth.** — *Report of the Entomologist for 1910 U. S. Depart of Agr.*, pp. 10-13. Washington 1910.

United States

The principal efforts of the Bureau of Entomology during the fiscal year 1909-10, have been in connection with the importation into the United States of parasites and predatory enemies of *Liparis monacha* and *Euproctis chrysorrhea*.

Calosoma sycophanta an imported European predatory beetle, is already well acclimatised and increases rapidly. The same may be said of the tachinid fly, belonging to the genus *Compsilura*, and of the European *Monodontomerus*.

P. MARCHAL. **The Parasites of the Olive Fly in Tunisia.** (Les Parasites de la Mouche des Olives en Tunisie). — *Comptes Rendus Hebdom. des Séances de l'Académie des Sciences 1911*, Sem. 1^e t. 152, N. 4 (23 Jan. 1911), pp. 215-168, 3 fig. Paris, 1911. **657**

Tunisia

The results of investigations undertaken to ascertain whether *Dacus Oleae* Rossi lives under similar conditions in N. Africa and Europe, in so far as its natural enemies are concerned. The first observations were made in Tunisia, and were continued in Paris.

The numerous hymenoptera which are parasitic on *Dacus*, and which M. Marchal has hitherto succeeded in rearing, belong to three species: two Chalcididae, *Eulophus pectonicornis* L., *Eupelmus urozonus* Dalm, and one Braconid, *Opius concolor* Szepl.

The two first are already known as parasites of *Dacus Oleae* in South Europe, but *Opius concolor* is a new Braconid, peculiar to North Africa, and found last April at Sussa by the writer, for the first time. It appears to him, capable of becoming a very important factor in hindering the multiplication of the Olive Fly.

O. concolor, is the only internal parasite of Dacus which has hitherto been discovered, it lives throughout the year at the expense of its host, and passes the winter, either as larva or nymph, actually in the pupae of the fly.

In undertaking preventive or destructive measures against *Dacus Oleae*, it is very important (judging from our knowledge of the life-history of *Opius*) to protect and foster the increase of the latter. Its absence in Europe will be soon remedied, as arrangements are being made in France for the importation and naturalization, in the Southern districts, of this useful auxiliary.

SCHENK JAKAB. **Destruction of Locusts by Rooks and Storks.** (Von der Vogelwelt verhinderte Heuschrecken Plage). — *Aquila. Zeitschrift für Ornithologie*, t. XVII, pp. 258-261. Budapest, 1910. **658**

Hungary. South Africa

In July 1909, great quantities of locusts appeared in a pasture of about 500 hectares, in the commune of Aroktö (Hungary). So large was the number of these destructive insects, that a plague of them was feared, and the authorities were on the point of sending word to the Royal Institute of Entomology, when great flocks of crows and of storks came to the rescue, and destroyed nearly all the insects in a fortnight. The writer mentions the signal services rendered to the farmers of South Africa by the storks which emigrate thither in winter, and penetrate as far as the borders of the Kalahari desert. The locusts find a refuge in the desert, but fall an easy prey to their winged foes, as soon as they attempt to leave it.

It has been proved, that the birds return for several years in succession to places where they have once found a plentiful supply of locusts. There is a law in South Africa for the protection of storks.

659 T. De Stefani. **Observations on Locusts in Sicily.** (Alcune notizie sulle Cavallette). — *Bollettino del R. Orto Botanico e Giardino Coloniale di Palermo*, An. IX, fasc. 1, 2, 3, gennaio-settembre 1910, pp. 123-125. Palermo 1910.

Italy: Sicily

Recent researches have proved that *Stauronotus maroccanus* Thunb, which together with another locust *Decticus albifrons* Fabr. causes great damage in Sicily, and which has been controlled by insects devouring its eggs, has now found other enemies in certain birds.

In the district of Terrasini, large flocks of crows (*Corvus corax* L.), and of jackdaws (*Monedula turrinam* Brehm) have been observed feeding on the young larvae of *Stauronotus maroccanus*.

660 K. Müller. **Remedies against Vine Pests. Sulfabion.** — *Bericht der Grossh, Badischen Landwirtchaftlichen Versuchsanstalt Augustenberg über ihre Tatigkeit im Jahre 1909*, in-8°. Karlsruhe 1910.

Germany: Baden Alsace

Insecticides as remedies for Eudemis and Cochylis. — The following insecticides were tried.

1) A 1.33 % solution of nicotine.

2) 3 % solution of soft-soap (a mixture of alkaline salts and various fatty acids).

3) A solution containing 2 % barium chloride and 1 % copper acetate.

The nicotine and soft-soap solutions were applied together with 2 % Bordeaux mixture. The barium chloride being mixed with copper acetate, is useful against Peronospora. In two experiments carried out at Sasbachenwald and at Constance, the nicotine killed at the former place 50.8 % of the caterpillars, and at the latter 25 %.

The soft-soap destroyed 57.9 % and 18.8 % respectively; and the barium chloride 36.9 % and 1.9 %.

The unsatisfactory results obtained at Constance, were due to heavy rain closely following the spraying.

As a measure against Eudemis, the vines were sprayed with the nicotine solution at Sasbachenwald and those so treated, yielded 0.12 litres more than those to which 2 % Bordeaux mixture had been applied.

The crop amounted to 524 litres per *morgen* (= 36 ares) while that of the vines treated with soft soap and barium chloride was respectively 0.06 litres per vine, or 269 litres per *morgen*, and 0.09 litres per vine, or 381 litres per *morgen*.

Soft soap and Bordeaux mixture. — If a 3 °/₀ solution of soft soap is added to a 2 °/₀ of Bordeaux mixture, a cheese-like sticky precipitate is formed, consisting principally of copper and lime salts of fatty acids. Although the soap solution has the property of wetting the leaves and adhering to them (even when the latter are covered with cob-webs) which makes the remedy especially useful in the cases of the above-mentioned parasites, the liquid obtained by filtration gives on warming no fatty acid and has no adhesive properties. Therefore, it is best not to mix the soft-soap and Bordeaux mixture, but first to spray with 2 °/₀ solution of the latter, and, when this is completely dry, to apply the soft-soap solution. This method has also the advantage of being easy to carry out.

Experiments with "sulfabion.,, — In 1909 a firm at Strasburg put on the market a fungicide emulsion which they called "sulfabion.,, It is a deuse yellow liquid preparation containing sulphur, which is diluted with twice or thrice its vol. of water and used as a spray. In this form, it adheres closely to the leaves, even after heavy showers.

As a prophylactic against Peronospora, sulfabion was as efficacious as sulphur dusting. but as the pest appeared little in 1909 in Alsace, no positive results were obtained. As regards cost, the price per quintal of sulfabion, is in Alsace, 27 marks (27 s.) while that of sulphur is only 13.2 marks. But as one spraying of the former is sufficient, while the sulphur must be used several times, the cost of the two treatments is about equal.

The composition of the sulfabion used in 1910 was different from that of 1909.

L. Moreau and E. Vinet. **Insecticides in Vine Cochylis.** (Sur les traitements insecticides en Viticulture). — *Comptes Rendus Hebdom. des séances de l'Acad. des Sciences 1910*, 2^me^ Sem., t. 151, N. 23 (Dec. 5th 1910), pp. 1068-1070. Paris, 1910. **661**

Fravce: Maine et Loire

Researches carried out at the Enological Station at Angers, for the purpose of ascertaining the proportion of insecticide which is retained by the bunches of grapes.

1) After one and two applications, made before flowering, in order to destroy the first generation of Cochylis.

2) After treatment made some time after flowering, to destroy the second generation of the above insect.

In the latter case, the question of the amount of poison retained by the bunches and the stalks respectively, was taken into consideration.

All these points are of importance with regard to the efficacy of the treatments.

In these experiment, a mixture containing lead arseniate was used, under the conditions set forth in the following table. The insecticide was applied by means of knapsack apparatus furnished with special nozzles.

Date of the treatment	Arseniate of lead gr. per hectolitre	No of litres per 100 stocks	Average No of bunches per stocks	Average weight of bunch of Chemin
May 31st	411.6	111.3	7.46	0.42 grs.
June 14th	617.4	137.3	8.01	1.36 »
August 6th	617.4	310.7	14.06	19.87 »

The results were as follows:

1) The amount of insecticide retained by the bunches after the first treatment was, very small in proportion to the quantity used, more than 99 °/o being lost.

After the second application, owing to the development of the bunch, there in less loss.

It is considered, that with the present methods, and the use of traction apparatus, the amount retained would be still less, and insufficient to afford an efficacious remedy against the cochylis larvae.

2) A fortnight after the first treatment, the amount of insecticide found on the bunch, the weight of which had almost trebled itself during this time, was only 37 mg. per 100 gr. of bunches, while it was 139.1 mg., i. e. almost four times as much, on similar bunches removed immediately afther treatment.

This àmount of insecticide, which owing to the growth of the bunch, was no longer uniformly distributed over it, is useless to protect the fruit from the Cochylis larvae.

For these two reasons, therefore, a second application is necessary, all the more, because owing to the climate of the West of France, the hatching out of the larvae often occurs in batches.

3) The quantity of insecticide which remains on the bunch after the summer-treatment, is not in proportion to the development of the bunch. The grapes retain less of the poison (about 1 3 according to experiment) than the stalks of the bunch, though the surface which they present, is much larger.

The liquid runs over the grapes spreads itself over their surfaces unequally, and adheres to them with difficulty. To obtain a useful result, the grape and not the stalk, should be covered with the poison.

662 Brioux and Griffon. **Arsenical Treatment in the Culture of Fruit-Trees.** (Sur les traitements arsenicaux en Arboriculture fruitière). — *Bull. des séances de la Société nat. d'Agr. de France*, No. 10, pp. 864-872. Paris, Dec. 1910.

France

A batch of apple-trees was sprayed in March with arsenical Bordeaux mixture in such a way, as to combine cupric treatment against "Apple Scab" (1) with arsenical treatment against *Anthonomus pomorum*, the apple-blossom weevil. (1 °/₀ sulphate of copper; 1 °/₀ lead arseniate).

Another batch, together with some pear-trees, were treated in the same manner, but at the end of April (the date of the unfolding of the buds), which is a good time to hinder the development of *Fusicladium pirinum* Lib. the fungus which produces "Pear Scab."

During May, both apple and pear trees also, were again sprayed with the cupric-arsenical mixture.

The fruit developed well and was entirely free from caterpillars of *Carpocapsa pomonella.*

Excellent results were also obtained by this prophylactic against the Lackey moth, *Bombyx neustria*, *Rhynchites Bacchus* and also against *Liparis chrysorrhaea*, but it had no effect upon the *Lisette du Pommier*, or plant-lice.

Standard peach-trees in the open, were treated with lead arseniate only (as this plant cannot stand copper) the remedy was most efficacious against the Lackey moth.

Fruits were taken from trees treated with arsenic and trees not thus treated, and it was found on analysis, that lead and arsenic remain a fair time on the surface of pears and apples, just as they do on that of grapes.

Until the end of July, appreciable quantities of the above substances (2.10 to 14.2 mgr. of lead, and 0.30 to 1.30 mgr. of arsenic per kilo of fruit are to be detected, but at the close of Sept, the time of gathering) lead can be no longer found, and the amount of arsenic is very small, at most some hundredth parts of a milligram per kilo of fruit.

(0.001 to 0.10 mgr.; an average of 0.01 to 0.05 mgr.).

663 Truelle. **Controlling Chematobia, Winter moths harmful to Apple Trees** (La destruction rationelle des Chematobies). — *Bulletin des Séanees de la Société Nat. d'Agr. de France*, No. 8, pp. 722-729, Paris, 1910.

France

A description of the ravages made by these Lepidoptera on fruit trees, especially apple trees, and an account of the life history of the insects.

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(1) A cryptogamic disease caused by *Fusicladium dendriticum* (Wallr.) Fuck. [*Ed.*].

A band of paper of a certain width, coated with viscous substance, is generally put round the trunk, in order to prevent the wingless females from depositing their eggs on the tree. This method is not always efficacious for owing to the action of the sun and rain, the sticky substances lose their properties, and cease to present any obstacle to the ascent of the inuects.

The following are formulae of viscous compounds, which appear to give excellent results when spread upon parchment paper.

French formula. — 500 gr. colza oil and the same quantity of lard are heated till the amount is reduced one third, then the same weight of turpentine and colophany are added and the mixture stirred continually till these are thoroughly melted.

The consistency should be that of a thick syrup, if too liquid, the boiling must be prolonged, if it is too viscid, a little oil can be added.

If well prepared, this glue remains viscid for three months.

German formula of Oberlin. — Take equal parts of colophany and linseed oil (500 gr. or 1 kilo). The former should be melted in an earthen jar, the oil added, and the whole stirred until it is completely mixed.

Formulae recommended in France and in Germany. — 700 gr. of wood-tar, and 500 gr. of colophany are carefully heated (being stirred all the time) in an iron vessel. When they are completely melted, 500 gr. of soft soap should be first added, and subsequently 300 gr. fish oil.

The vessel is then removed from the fire, and the contents stirred till the mass solidifies.

It is necessary when the trees are planted, to destroy any Chematobia eggs which may be found. For this purpose, a mixture of chalk, sodium chloride, silicate of sodium and water is advised.

All trees coming from infected nurseries, must be prevented from infecting the plantations with vegetable or animal parasites. Supervision on plants is done in France by the Paris Entomological Station, directed by M. Marchal.

664 C. Fuschini. **Measures against Noctuae in Umbria.** (Contro i danni delle "Agrotidi" nell' Umbria. - Osservazioni ed esperienze). Pp. 22. Perugia. 1910.

Italy: Umbria

In April, May and June 1909, the districts of Norcia and Cascia, and later, other parts of Umbria, were infested with large numbers of Noctuae larvae, belonging, in some cases to *Agrotis segetum*, but more often, to *A. aquilina.*

Owing to the immense amount of damage caused to cereals, other crops and vines by the wide spread occurrence and multiplication of these insects, the investigations were not confined to the study of their life-history but extended also to the discovering of the best means of combating the pests.

Amongst the methods which proved efficacious, the following may be mentioned:

1) *Direct attack.* Destruction of the caterpillars by hens and other domestic fowls.

These auxiliaries were permitted to accompany the farmer during his labours.

2) *Attack by means of chemical agents.*

(Carbon disulphide being more efficacious than superphosphate with petroleum).

3) *Special cultural treatments.* One of the best of these, is green manure in the form of white mustard, *Sinapis alba.*

This should be dug in, either in the spring, or in the autumn previous to sowing.

Besides acting as an insecticide, this fertilizer helps to prepare a useful reserve of organic matter in the soil.

A. HÉRAUD. **Calcium Sulphide, a Remedy against Scale-Insects and Fumago.** (Un bon remède contre les cochinelles et la fumagine). — *Progrès agricole et viticole,* No. 49, pp. 696-698, Montpellier, 4 Dec. 1910. **665**

France

Very successful experiments were made with calcium sulphide in the distruction of the scale-insects, which attack Evonymus, laurels, and rose-bushes. The remedy is prepared as follows:

Three kg. of quick-lime are slaked with a little water. Three kg. of sublimated, or powdered sulphur are slightly moistened with water. Then first the slaked lime, and subsequently the sulphur paste are put into a boiler containing 20 litres of water and boiled for an hour.

The mixture should than be filtered through a coarse cloth, and sufficient cold water added to replace the amount which has evaporated. The dilute solution of calcium sulphide is caustic, it corrodes and detaches the scales of the scale-insects. It also poisons the insects by means of the sulphuretted hydrogen which is liberated. The Cocci disappear, and therefore no more is seen of *Fumago.*

In winter, a concentrated solution should be used; in washing trunks, 3 litres of solution are diluted with 7 litres of water. While 8 litres of water are added to 2 litres of solution for the treatment of branches which bear buds, and also in the case of citrus and olive-trees.

A. W. B. EDWARDS. **An Attack by the Large Larch Sawfly (*Nematus Erichsoni*).**—*Trans. of the Roy. Scottish Aboricultural Society,* Vol. XXIV, P. I, pp. 42-44. Edinburgh, Jan 1911. **666**

Great Britain: Cumberland

A description of the different means employed to repel the attack of *Nematus Erichsonii* on the plantations at Thirlmere belonging to the Manchester Corporation.

Piling up the soil at the foot of the trees, and mixing in quick-lime, has been proved to be of little use, and the same applies to burning branches on the ground in May, and to shaking the trees.

Good results were obtained by crushing the insects by hand, where the height of the trees permitted it.

When however the latter are higher, reaching even 23 ft., a very efficacious remedy is spraying with a compound of 15 gr. arseniate of copper, 15 gr. wheat flour, and 18 litres of water. For trees above 23 ft., bands of tar are recommended 50 cm. wide, and at a height of a man's chest, this tarring should be repeated every fortnight during the attack of the parasite.

Birds are very useful auxiliaries, they should be encouraged by providing them with nesting boxes and with food in the winter.

667 A. L. Quaintance, E. L. Jenne, E. W. Scott and R. W. Braucher. **The One-Spray Method in the Control of the Codling Moth und the Plum Curculio.** — *U. S. Dpt. of Agr., Bur. of Entomology.* Bull. No. 80, Part. VII, pp. 113-146. Washington, 1910.

United States

From the data, covering one season's work in three States, it appears that very satisfactory results may be obtained by the one-spray method, in the control of the Codling moth and plum curculio although further experimentation will be necessary before final conclusions can be reached.

It must not be forgotten, however, that it is necessary, under eastern conditions, to make applications of Bordeaux mixture or other fungicide for the control of fungous diseases; so that in effect the one-spray method under present practices can not be recommended to fruit-growers in regions where fungous troubles, such as apple scab, apple fruit blotch, bitter rot, and leaf-spot affections require treatment.

The results, however, show the great importance of very thorough spraying to fill the calyx cups with poison. Although the importance of accomplishing this has long been recognized by entomologists and fruit growers, it would appear that this work has not been done with sufficient thoroughness in the past, and eastern apple growers might certainly with great profit give more attention to thoroughness in the first spraying for the codling moth, immediately after the falling of the petals.

The russeting of the fruit following such drenching applications of Bordeaux mixture, in which arsenic is generally employed, may doubtless be avoided by the substitution as a fungicide of diluted or self-boiled lime-sulphur wash.

F. PICARD. **Are Cochylis Larvae to be found in Vine Shoots? Under what Conditions are Winter Treatments Useful?** (Y a-t-il des Cochylis dans les Sarments? Dans quelles conditions doit-on éffectuer les traitements d'Hiver?). — *Progrès agricole et viticole*, No. 2, p. 37, Montpellier, Jan. 8, 1911. **668**

France

The statement has been made, that the Cochylis larvae retire to the pith of the vine-shoots, when about to change into chrysalides, thus rendering useless all winter treatments, such as stripping and scalding·

The writer has studied the question carefully, and after examining numberless specimens, which were considered as affording proof of the above statement, he is able to assert that, in every case, the larvae and cocoons were those of harmless Hymenoptera or insects allied to the bee family. Further the Cochylis larvae are not adapted to perforate the hard wood of the vine-shoots, therefore they need not be a source of apprehension, from this standpoint.

As to the conditions which render winter-treatment useful. it has been sufficiently demonstrated that, in districts infested by these insects, scalding, and especially stripping are indispensable.

There are occasion when these precautions can be omitted:

1) When the vineyard is surrounded by others belonging to owners, who will not carry them out simultaneously, the danger of contamination being in this case too great.

2) When, on examining the bark, few larvae are found, whether owing to their destruction by the various parasitic Hymenoptera or Diptera, or to their having perished for want of food, or having remained in the grapes at the vintage.

In any case, united action is necessary, and probably will have to be enforced.

P. MAISONNEUVE, L. MOREAU and E. VINET. **Controlling Cochylis in Anjou in 1910.** (La Lutte contre la Cochylis. Etudes et Expériences faites dans l'Anjou en 1910).—*Revue de Viticulture*, Paris, Nos. 890, 891, 892, pp. 9, 39 and 57, 5-12-19 Jan. 1911. **669**

France: Anjou

Three years of experimental work against Cochylis have afforded the means of checking some of the observations already made concerning the life-history of the insect, the value of insecticides, and the best means of applying the latter, in years when these pests occur in great quantities.

With regard to their life history, it has been observed, that in two out of the three years, the appearance of the butterflies, and therefore of the hatching-out of the larvae, took place at intervals extending over a considerable time. This fact justifies the repeated application of the remedies in spring, as well as in summer. The larvae of the first generation undergo for the most part, their metamorphosis partly in the soil, those of the second usually take refuge beneath the bark when they become chrysalides. The best insecticides are lead arseniate, and nicotine, after these come *Schloesenite* and iron arseniate. Chloride of barium is useless. Two applications are necessary as a prophylactic measure against the generation. In summer, the liquid does not extend well over the surface of the berries and adheres badly. The bunches must be reached, and the large apparatus cannot carry out the applications in the spring.

The following treatments, seem to be efficacious:

1) In winter, stripping or scalding.
2) In spring, two applications of lead arseniate or of nicotine.
3) In summer, one or two nicotine applications.

Associated with cupric mixtures, the above insecticides are good remedies against mildew.

The efficacy of the treatment depends greatly upon the care with which it is carried out.

4) The first application should be made a fortnight, or three weeks, after the appearance of the first moths, tbe second, after an interval of 10 or 15 days. The summer treatment should be made at the beginning of August.

670 G. Verge. **Scalding as a Remedy for Cochylis.** (Essais d'ébouillantage contre la Cochylis. Recherches et observations sur la valeur de ce traitement). — *Progrès agricole et viticole*, N. 1, pp. 10-12. Montpellier, Jan. 1st 1911.

France

The success of late scalding of vine-stocks in destroying the Cochylis larvae which occur beneath the bark, has been much called in question.

Experiments have been made on the subject at the Agricultural School of Montpellier.

The temperature fatal to the chrysalides was determined in the laboratory. It appears, that a very high temperature is not necessary for the purpose, the chrysalides in their cocoon are killed by an immersion of 3 seconds in water at 64° C to 66° C. In the case of a vine in the open, the operation was carried ont by means of an ordinary scalding apparatus.

The water had a temperature of 98° C to 100° C, on reaching the bark and beneath it it was usually 92° C, and 28 to 30 seconds after watering it had not sunk below 70° C.

The heat necessary to kill the chrysalides can thus be regularly obtained.

The stocks, after treatment, were immediately stripped of bark and the dead and living pupae were counted.

Results of experiments:

Plot which received 1.350 litre water per stock:

Number of chrysalides, dead	95
» » living	14
» Mortality	87 °/o

Plot which received 2.280 litres of water per stock:

Number of chrysalides, dead	99
» » living	4
» Mortality	97 °/o

Control plot, on 3 stocks were found:

Chrysalides, dead	21
» liivng	20

R. Brunet. **Control of Cochylis and Eudemis. Results of the Investigations of the "Revue de Viticulture."** (La lutte contre la Cochylis et Eudemis. Conclusion de l'enquête de la *Revue de Viticulture*). — *Revue de Viticulture*, No. 894, Febr. 2, 1911. **671**

France

The enquiries made by the *Revue de Viticulture* amongst its collaborators and correspondents in the different vine-growing districts of France, have proved that it is possible to combat Cochylis and Eudemis in the vineyard.

The following measures must be adopted.

The protection of their natural enemies. — The animal and cryptogamic parasites of these insects should be noted, and also the various insectivorous birds which prey on the latter.

The cold, wet summers which have been the rule of late, have no doubt favoured the increase of Cochylis and Eudemis.

If these exceptional seasons should be succeeded by a warm dry summer, the multiplication of these pests would be hindered.

Winter treatments. — These, which have a relative efficacy, include:

1) Stripping of the bark, which can be effected by means of gloves, brush, chain, scraper, rasp, thongs, springs, or knife, after preliminary applications of acid iron sulphate (iron sulphate 40 °/o, sulphuric acid 1 litre, either hot or cold).

2) Lime-washing, which does not give such good results as in the case of Pyralis.

3) Singeing and putting metal or wooden bells over the vines while sulphur is burnt under them (Clochage). These operations have effects similar to those produced by stripping.

4) Traps of straw placed in the vineyards in the autumn to attract the larvae, which latter should at once be burnt.

Spring and summer treatments. — These include:

1) Catching the moths with a limed screen; this is less effectual than chasing them.

2) Chasing them by help of lamp-traps which is much practised in some districts.

3) Searching out the larvae and crushing them by hand—too costly a process.

4) The immersion of the young bunches in receptacles containing insecticide solutions can only be resorted to in the case of cultivation on a small scale.

5) Spraying liquid insecticides on the bunches of grapes.

This treatment is the most efficacious, if carried out while the branches are still young; two solutions give constant results, lead arseniate, and nicotine. Both these substances may be added to cupric mixtures.

Number and time of treatments. — Nicotine can be used for Cochylis either alone, or mixed with arsenic salts. The latter must not be used after the time of flowering. Two or three applications are necessary, according to circumstances.

The time for these treatments coincides generally with the period of flowering, and just before the grapes change colour.

It is essential that they should be made during the week or fortnight which follows the emergence of the moths. The solutions of arsenic, nicotine and copper are also efficacious against mildew, and no further remedies are needed.

The work should be done slowly, and carefully, and if some of the leaves are removed, the last application is facilitated.

672 P. R. Jones. **Spraying European Fruit Lecanium and the European Pear Scale.** — *U. S. Dpt. of Agriculture. Bureau of Entomology. Bull.*, No. 80, Part VIII, pp. 147-176. Washington, Nov. 28th, 1910.

An account of results obtained by the use of different sprays as remedies against *Lecanium Corni* Bouché, and *Epidiaspis pyricola* Del Guer.

United States

The sprays which proved most efficacious, and at the same time were cheapest, and easiest to prepare and to apply, were composed of 6 % distillate-oil emulsion and 12 % crude-oil emulsion.

These substances killed the Lecanium, and freed the trees from lichens. They do not injure the trees when applied as a winter treatment.

The formula of the distillate-oil emulsion was:

Hot Water	12	gallons
Distillate-oil (28° Baumé) . . .	20	»
Fish-oil soap	30	lbs.

Formula for 12 % crude-oil emulsion:

Fish-oil soap	5	lbs.
Lye	1	»
Crude-oil	6	gallons
Water . . . . . , ...	43	»

The 6 % distillate-oil emulsion, costs about 1 1/4 d. for each prune-tree and 1 3/4 d. for each apricot tree.

The 12 % crude-oil emulsion, costs about 1 d. for each prune tree and 1 1/4 d. for each apricot tree.

All sprays, to insure the best results, should be applied with a power outfit at high pressure (180 to 200 lbs.). A coarse drenching spray applied with crook nozzles is preferable, and February is the best month for the work.

WASSILJEW. **Control of *Agrotis*.** (Bekämpfung der Wintersaateule *Agrotis*). — *Chemiker Zeitung. Cöthen*, XXXIV Jahrg., N. 142, p. 185. **673**

Russia

Good results have been obtained in the destruction of Agrotis and other insects of the same species, which cause great damage to the beetroot crops in Russia, by the use of shallow vessels filled with molasses (if possible in a condition of slight fermentation).

By this means, during the second fortnight in July, 5 millions of moths were destroyed, which is equivalent to the destruction of 750 millions of larvae.

Insects noxious to special Crops.

D. M. KOROLIKOFF. **Thysanoptera Harmful to Gramineae.** (Tripsi jivoustchie na naçikh Slakakh). —*Isviestiia Moskowskago Selskhokhosiaistvennago Instituta.* (Annals of the Agron. Institute of Moscow), God. XVI, Kniga 3, pp. 192-204. Moscow, 1910. **674**

Russia: Moscow

Researches on the Thysanoptera which are injurious to cereals in Russia.

The observations were made in fields of oats, rye, wheat and Timothy (*Phleum*), at the Station of Experimental Agriculture of Moscow, and in the district around Petrovsko Rasumovske (Gov. of Moscow).

The following species were determined.

Anthothrips aculeatus, Fabr.	*Aptenothrips rufus* Gmel.
Limothrips denticornis, Hal.	*Aptenothrips nitidulus*, Hal.
Physopus vulgatissimus, Hal.	*Chirothrips manicatus*, Hal.

These insects pass the winter in the green, soft tissues, which abound in the leaf-sheaths of young plants and when spring comes, they migrate to the early cereals, and later on, to the summer crops.

They injure the plants chiefly by feeding upon the juices of different parts of the flowers, and especially of the ovary.

The female *Anthothrips aculatus* deposits its eggs on the fertile glumes of rye.

Shortly before the rye-harvest, the Thysanoptera invade the oats and wheat-fields; the adults and larvae attack the ears, taking up their position, by preference, along the groove in the caryopsis where the tissues are most tender and juicy.

The following remedies are advised.

1. The destruction of weeds, especially Leguminosae, Gramineae and Compositae.

2. The sowing of some Gramineae (oats or rye) round the fields under cultivation. This should be done a fortnight before the time of sowing the winter cereals, in order to attract the insects, and to afford them shelter at the time when the crops are coming up. Later, the oats and rye are removed, and with them a large number of Thysanoptera.

675 DELGOVE and FOEX. **Madagascar Insects and Weeds Injurious to Rice Crop.** (Determination de quelques Insectes et Plantes nuisibles au Riz pendant sa Vegetation), — *Colonie de Madagascar et Dépéndance. Bull. économique.* Gouvernement générale, 10^{e} année, No 1, pp. 103-104. Tananarive.

I. — INSECTS.

Madagascar

SAKALAVALO or HASMBARY. — This is a small beetle (*Trichispa sericea*) of the Hispidae which occours very plentifully in dense colonies when the season is dry. It appears from Aug-Sept; and attacks the leaves of the young rice-plants, extracting the sap, and thus causing them to wither speedily, they are not however killed, but their growth is retarded, this is resumed as soon as the beetles have disappeared, usually from Nov. to Dec.

The invasions are local, and often one rice-plantation is infested, while its neighbours escape untouched. The Sakalavalo are sometimes washed away by floods and thus destroyed.

FANO (Coleopteron). — *Heteronyclus plebejus* (*Dynastini?*) — The larvae of this insect devour the roots of the rice-plants, especially when the rice-fields have an insufficiency of water. The adult form attacks the stems.

Gaps which occur in the crop, are due to the destruction of the plants by the larvae. Rice plantations near villages, are usually free from these pests, as ducks eat them with avidity. These insects attack other plants besides rice.

MOHIDRANO (Lepidopteron). — The larvae destroy the rice stems by devouring the central portion. But, as the enemy is not widely-spread, it does uot effect much damage.

The name is applied to the caterpillars of two different species, of which one belongs to the *Hesperidae*, the other is enclosed in a sheath, it would be necessary to breed some of them, in order lo determine the species.

II. — PLANTS.

MALAMASAMBORONA. — This plant frequently occurs in deep rice-fields, it grows very rapidly, and exhausts the soil to the detriment of the crop. Its scientific name is *Boottia*, and it is a Hydrocharidaceae peculiar to Madagascar.

SIHANAKA (a kind of cress). — It is the *Ludwigia* sp. (Oenotheraceae).

This occurs in scattered localities, it is intrusive, but does not seem to do much harm to the rice.

SONJOMBOAY (*Lophiocarpus guyanensis*, Alismaceae).

A kind of saggitaria which grows every where in the tropics, it is frequently met with in deep rice fields and it is difficult to eradicate.

TELORIRANA (Cyperaceae). — Occurs occasionally every where but as it is uprooted at the time of hoeing, effects little damage.

GOANA *Oplismenus Crus-galli* (Gramineae). — Much resembles the rice-plant, it is very voracious, but easily got rid of during hoeing operations.

The only method of combating these weeds successfully is by uprooting them.

T. DE STEFANI. **The Insect Foes of Sulla, *Hedysarum coronarium* L.** (La Sulla ed i suoi Insetti dannosi). — *Bollettino del R. Orto Botanico e Giardino Coloniale di Palermo*, Anno IX, fasc. 1-2-3, pp. 116-122, Gennaio-Settembre 1910. Palermo, 1910. **676**

Tunisia. Italy

A description of two insects which cause great havoc among the crops of " Sulla „ (*Hedysarum coronarium* L.) in Tunis and Sicily.

Important data are also given concerning the life-history of these pests, one of which is *Sphenoptera lineata* F. = *S. geminata* Ill. a coleopteron belonging to the family of the Buprestidae, while the other, is a Lepidopteron, the species on which has hitherto not been determined.
Their larvae live on the roots of *Hedysarum coronarium*, devouring the pith and the surrounding soft parts, and causing great and irreparable damage by the long tunnel which they bore.

***Piesma capitata* on Sugar Beets in Silesia.** (*Piesma capitata* genannt Rübenschädling). — *Praktische Blatter für Pflanzenbau und Pflanzenschutz*, p. 156. Stuttgart, Dezember 1910. **677**

Germany: Silesia

In some parts of Silesia, the sugar-beets are damaged by *Piesma capitata* (*Tingididae*) which causes the leaves to curl.

As a remedy, the destruction of all weeds, is suggested and especially all species of Chenopodiaceae, as these plants serve as convenient places for the female *Piesma* to deposit their eggs.

678 H. L. Dutt. **Sugar Cane Borers.** — *Quarterly Jonrnal of the Depart. of Agric. Bengal*, p. 66 and 67. Calcutta, Oct. 1910.

British India: Bengal

The sugar-cane crop of Bengal is attacked by several kinds of caterpillar-borers, of which the following are the most important.

I. "White moth borer„ (*Scirpophaga auriflua*). — The females lay their eggs in masses on the top leaves, and generally on the under-surface. The young larvae bore into the unfurled top leaves, and go down till they come to the sappy portion of the stem, when full-grown they stop their downward course, and bend the tunnel till they reach the bark of the cane. Here, they make an opening and web it up again by silk. The caterpillar passes its resting stage in this cavity, and the moth comes out through the opening. When a young cane is attacked, the shoot dies, and produces a "dead-heart,„ in the case of old plants, the death of the growing point causes the buds near the apex to develop and form a "bunchy top.„ The yield of sugar is thereby reduced.

Remedies:

1) The egg masses are prominent; they should be collected and burnt;

2) The "dead hearts„ should be cut ont and buried, or burnt with the caterpillars in them. The shoot should be cut below the hiding-place of the larva.

II. "Moth borer„ (1). — The eggs are laid on the leaves, and the caterpillars enter the young shoot just above ground, or a little way up the stem, but not through the apex, or at any point within a few inches from the top.

The effect of the attack of these larvae is to produce a "dead heart„

Remedies:

1) All the withered shoots containing caterpilars, should be cut ont, just below the surface of the ground, and burnt.

2) Maize, or sorghum can be sown as a trap crop. The moths will lay their eggs on these plants, which should be removed and destroyed with the caterpillars in them six weeks, or two mouths after sowing.

III. "Root-borer„ (2). — The larvae attack the roots of the cane, and the whole plant dries up, or becomes stunted in appearance.

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(1) *Daethraea saccharalis* Fabr. occurring in different parts of India, and known under the names, *mandranah*, *morijikila purugu*, and *majera*.

The appearance of this insect usually coincides with periods of drought. In 1857, this pest entirely destroyed the crops of "Red Sugar Cane„ in the districts of Rungpore, Hooghly and part of Burdwan. (C. Watt. *Dictionary of the Economic Products of India*, vol. VI, part. I, p. 152. [*Ed.*].

(2) *Polyocha saccharella* (Lepidopteron). Cf. N. Deerer. *Cane Sugar*. Altrincham (Manchester), p. 129, 1911. [*Ed*].

Remedy. — The stubble should be removed, immediately after harvest and either burnt, or buried in a deep pit.

ISAAC D. KORANTENG. **White Ants in Cacao Trees on the Gold Coast.** — *Report of the Agr. Dpt. for the Year 1909*, p. 9. Gold Coast, 1910. 679

Gold Coast

A great deal of damage is done to mature and young cocoa trees in various parts of the Colony through the attack of white ants.

No indication of their attack can usually be seen until it is too late to take effective steps against them. They tunnel the ground and feed on the roots eating away the tissues and leaving only a shell. The trees very soon fall over, but by the time this occurs the ants have removed to other trees which they attack in a similar manner. Planters whose trees had been so attacked were advised to remove all decayed wood from their plantation and isolate the attacked trees by a 2 ft. trench.

H. SCHMIDT. **The Effect of Aphides upon the Inflorescence of *Daucus Carota.*** (Wuchsstauchung, Zweigsucht, und Vergrunung an *Daucus Carota* L. hervorgerufen durch am Stengelgrunde lebende Aphiden). — *Fuhlings Landwirtschaftliche Zeitung*, 60 Jahrgang, Heft 3, pp. 103-104. Stuttgart, 1 Feb. 1911. 680

Germany

Amongst the different changes brought about in the aerial portions of *Daucus Carota* through the agency of Aphides, one affecting the inflorescence, merits special mention.

The bracts forming the involucre of the umbel were abnormally developed, and only veined with green down the centres, the rest of the bracts being white.

This caused the latter to resemble flowers.

The flowers were transformed into antherlike organs.

This resemblance was due to their rounded form, yellowish tint, and short, red, fleshy peduncles.

The whole inflorescence appeared like a single flower.

P. MARCHAL. **On the Occurrence of *Eudemis botrana* in the Neighbourhood of Paris.** (Sur la Présence de l'*Eudemis botrana* aux Environs de Paris). — *Bull. des Séances de la Soc. Nat. d'Agric. de France*, No. 9, pp. 770-777. Paris, 1910. 681

France

After having been confined for a long time to the department of the Maritime Alps, *Eudemis botrana* is now spreading rapidly northwards.

Already, for some years past, this moth has done much harm in the vineyards of the valleys of the Rhine and the Moselle.

This season, it has made its appearance in the neighbourhood of Paris.

An efficacious remedy against *Eudemis* and *Cochylis* (both of which pests play equal havoc in the vineyards) is nicotine mixed with Bordeaux mixture.

The spraying should be done in spring before the eggs hatch out.

If the caterpillars have already emerged, the nicotine and Bordeaux mixture can be advantageously replaced by a compound consisting of powdered pyrethrum, and a solution of soft soap, or an alkaline solution of resin.

682 G. LAFFORGUE. **Cochylis and Eudemis in the Gironde.** (La Cochylis et l'Eudémis dans la Gironde). — See No 625 in this *Bulletin*.

683 N. JACONTHOFF. **Anthonomus Pomorum L.** (Le Charançon des Fleurs du Pommier, (*Anthonomus pomorum* L.). - Jablonevii Dolgonosik. Isviestia Moskovskago Selskokhosiaistvennago Instituta). — *Annales de l'Institut Agronomique de Moscou*, God. XVI. Kniga 3, pp. 229-253. Moskva, 1910.

Russia: Central and S. Russia

A summary of the results of numerous experiments on *Anthonomus pomorum* L, made in the gardens of the government of Moscow and of the Agricultural Institute.

The morphological characteristics of the species are described, and an account given of the life history of the insect, and of the measures which have, so far, been most successful in combating it.

The pest is widely spread in Russia where the apple trees, when in flower, have suffered much from its attacks.

The larvae do most damage when the floral buds develop slowly; they prey upon the young inflorescences, of which they destroy, according to circumstances, from 50 % to 75 %.

The campaign against this foe has been carried on already for some time in South Russia, and the Central provinces are now adopting serious measures.

The methods most used are as follows:

1) Depriving the insect of its winter quarters, by freeing the trunks from lichens and strips of dry bark.

2) Arranging faggots and twigs in such a manner, that the moths, which congregate there on the approach of winter, can be easily destroyed.

3) The use of ring traps made of fluted paper.

4) The trees are shaken, and all the insects which are dislodged, are caught in cloths or on screens,

5) Picking the damaged buds by hand, or with special scissors.

6) The choice of varieties of apple-trees with compact floral buds, which develop rapidly.

7) The application of lime, or better still, of a mixture of clay and lime. This should be used at the beginning of spring. (Tschoubouktschy's method).

Most of these methods were tried experimentally by the writer, who advises: for Central Russia, cleaning the trunks, collecting the insects on cloths and in ring-traps; but for S. Russia, on the contrary, nothing is so good, in his opinion, as the application, on an extensive scale, of Tschoubouktschy's system.

DAN. H. JONES. **The Part played by *Aphis Mali, Schizoneura lanigera.* and *Scolytus rugulosus* in the Spread of Fire Blight**. See No. 627 in this Bulletin. **684** **Canada**

W. M. SCOTT and A. L. QUAINTANCE. **Control of Brown Rot and Plum Curculio on Peaches.** See No. 628 in this *Bulletin.* **685** **United States**

P. NOEL. **The Medlar Pests.** (Les ennemis du Néflier, *Mespilus*). *Bulletin du Laboratoire régional d'Entomologie agricole,* premier trimestre de 1911 (janvier-février-mars), pp. 12-13. Rouen, 1911. **686**

List of the enemies of the Medlar:

France

HEMIPTERA.

1. *Coccus Mespili,* Geoff. — Medlar Coccus.
   Gall insects on the twigs and branches.
2. *Aphis n. 1855.* — Darboux and Houard.
   Causes leaf-curl.

HYMENOPTERA.

3. *Lyda clypeata,* Klg.
   The larvae eat the leaves in June and July.

LEPIDOPTERA.

4. *Rhodocera (Colias) Rhamni.*
   The caterpillar eats the leaves in June and July.
5. *Orgyia (Dasychira) fascelina,* S. V. — Striped Orgyia.
   The caterpillar eats the leaves in May.
6. *Liparis dispar,* L. — Bombyx disparate.
   The caterpillar eats the leaves in June and July.
7. *Arctia flava,* Fuessl. — Yellow Arctia.
   The larvae eat the leaves in Siberia and Switzerland.
8. *Chematobia brumata,* L. — Winter moth.

The larvae eat the leaves in the spring, in May.

9. *Teras abildgaardana*, Fl. — *Teras variegana*, S. V.
Moths in August and September.

10. *Tortrix cratægana*, Hb. — Leafroller.
Mentioned by Kaltenbach as being harmful to pear and medlar trees.

11. *Tortrix viridana*, L.
Curls, rolls and devours the leaves in April and May.

12. *Hyponomeuta variabilis*, Zell. — *Hyponomeuta padella* Rtzll. L.
Covers the trees with a silky web and devours the leaves,

13. *Depressaria Cotoneastri*, Nick.
The caterpillar eats the leaves in June.

14. *Ornix pfaffenzelleri*, Frey.
The caterpillar eats the leaves in June and July.

15. *Argyresthia sorbiella*, Tr.
Mentioned as destructive by Kaltenbach.

16. *Nepticula mespilicola*, Frey. — Medlar Nepticula.
Destroys the leaves in July and September.

ACARINA.

17. *Eriophyies n. 1856.* — Darboux and Houard.
An Erineum with red lower portion of border.

CRYPTOGAMIC DISEASES.

18. *Medlar Rust.* — *Gymnosporangium Sabinæ*, Dicks. — Confuscum. Plo
A kind of rust on the leaves.

687 W. E. COLLINGE **The Cherry Stem Borer. *Semasia Woeberiana* Schiff.** *The Journal of Board Agriculture*, Vol. XVII, No 10, pp. 828-830. London, Jan. 1911.

Great Britain: Kent Hertfordshire

During 1908, much damage was done to the cherry trees in various parts of Kent and in Hertfordshire, by the larvae of a small moth known as the Cherry Stem Borer. The pest increased during 1909 and 1910.

The cherry is more prone to attack than other trees, but the insect has infested almond. apple, laurel, peach, nectarine and plum trees.

It makes borings through the bark into the sap-wood; sometimes large cavities are formed, two to four inches in depth, and about the same width, extending from one to three feet in length.

Trees thus injured, are frequently attacked by fungi, the lower part of the stem quickly rotting, and finally dying.

The remedies suggested were designed with a threefold object, viz:

1) to make the surface of the stem obnoxious to the moths in order to prevent egg laying (for this purpose, grease, paraffin, bone oil etc. were smeared over the trunk);

2) To prevent the newly hatched larvae from boring into the bark. (The lower part of the trunk was covered with pitch, or a mixture of pitch and slaked lime);

3) To destroy the larvae in the cavities beneath the bark. (The trees were smeared over, to a height of between two and three feet, with a compound consisting of one part powdered napthalene, and three parts of clay, mixed together with water to the consistency of a paste).

L. SAVASTANO. **The Scale-Insect *Chrysomphalus dictyospermi* var. *pinnulifera*, Mask. in Sicily**. (La Cocciniglia bianca-rossa). — *R. Stazione Sperimentale di Agrumi e Frutticultura*. Circolare No. 1, pp. 1-5. Acireale, 23 gennaio 1911. **688**

The necessity of energetic measures against *Chrysomphalus dictyospermi* var. *pinnulifera* Mask., is here insisted upon. This coccus causes great damage to the plantations of citrus trees in eastern Sicily.

Italy: Sicily. Algeria

In Algeria, this pest has been exterminated by prompt action.

The most efficacious method hitherto tried is spraying with sulphur-lime wash, used in different proportions, according to the season.

a) Mixture for winter use:

Powdered sulphur of good quality . .	3 kg.
Quick-lime	3 »
Water	100 litres.

b) Mixture for spring and summer:

Powdered sulphur of good quality . .	5 kg.
Quick-lime	8 »
Water	200 litres.

Detailed instructions are given for the preparation and use of these sulphur-lime washes.

K. GEHRMANN. **A Pest of the Cocoa Tree in Samoa**. (Ein Palmenschadling auf Samoa). — *Der Tropenpflanzer*, No. 2, pp, 92-98, 15 Jahegang, 5 Ab. Berlin, Februar 1911. **689**

A beetle, probably belonging to the genus *Oryctes*, does much injury to the cacao-trees in Samoa. The insects, both male and female, penetrate through the sheaths of the folded leaves to the buds, attacking the young inflorescence and developing leaves.

Samoa

Enough is known of the life history of the beetle to make its control possible. The Government of German Samoa has taken energetic measures to suppress what might prove a serious danger in the future, and awards prizes to those natives who destroy the greatest numbers of the parasite.

690 F. H. CHITTENDEN. **The "Oak Pruner."** — *U. S. Depart. of Agric. Bureau of Entomology.* Circular 130, 7 pages. Washington, Dec. 10, 1910.

The Oak Pruner (*Elaphidion villosum*, Fab.) occurs in the greater portion of the Eastern United States, with the possible exception of Georgia, and one or two of the Gulf States.

United Stated

This insect. or allied species, will attack almost every kind of deciduous trees, shrubs, and vines with woody stalks.

According to the Forest Insect Investigation Bureau, the list of its food plants include oak, hickory, chestnut, maple, locust, elm, apple, plum, peach, pear and beech.

The young larva attacks the wood of the twig under the bark, which it finally cuts away in such a manner, that in time, the twig falls to the ground. The severed portions vary in size, from a few inches, to 2 or 3 feet in length. Within them, the « pruner » completes its metamorphoses, and they also serve as a breeding place for other wood-borers.

For this reason, the twigs should be collected and burnt.

Among the natural enemies of *Elaphidion villosum* are: the downy wood-pecker (*Dryobates pubescens*), the blue jay (*Cyanocitta cristata*), and the black-capped chickadee (*Penthestes atricapillus*).

691 C. MANICARDI. **Anomalies on the Development of the Buds of the Genus *Quercus* caused by the Parasite *Cnethocampa processionea* L.** (Anomalie nello sviluppo delle gemme del genere *Quercus* causate dal parassitismo della *Cnethocampa processionea* L.). — *Stazioni Sperimentali Agrarie Italiane*, fasc. XI-XII, pp. 914-916.

Italy

The presence of *Cnethocampa processionea* L. has been observed, for the last four years, in the mountainous district of the province of Modena.

This formidable parasite has continued increasing to such an extent, as last year, to seriously threaten the existence of the woods.

The continual contraction of the leaves and end shoots of the oak, caused by the caterpillars gives rise to interesting modifications. The buds of the young branches undergo a great change. They lose their characteristic shape completely, and become distinctly pointed; further, the single primitive bud divides into several groups at the same place.

This must be regarded as a special adaptive measure for saving the life of the plant by means of an abundance of shoots. Such leaves as succeed in developing, entirely lose their characteristic shape, and are fringed.

The caterpillars eat the margins of the leaves, the nerves remaining entire, and an oak which adapts itself to these abnormal conditions, puts out leaves, which resemble median nerves, but which, on closer observation, recall oak-leaves, although they have undergone a great modification.

LAWRENCE BRUNER. **A new Insect Enemy of the Western Yellow Pine (*Pinus ponderosa* Dougl.).** — *Forestry Quarterly*, Vol. VIII, No. 4, pp. 411-413. Cambridge (Boston) Mass, Dec. 1910. **692**

For some time, the native pines, growing along the pine-ridge of the N. W. of Nebraska, have been attacked and defoliated by an insect, which has been determined as *Lophyrus Townsendi*.

United States: Nebraska

A large number of *Pinus ponderosa* Dougl. hare been completely despoiled of their leaves by this enemy.

As little is, so far, known of the life-history of *Lophyrus Townsendi*, no remedies against it have been devised, but it has been found to have several parasitic foes; two species of *Tachina* flies, one *Bombyx*, and three Ichneumonids.

MYRON H. SWENK. **The Pine-tip Moth (*Retinia frustana* Scudder).** — *Forestry Quarterly*, Vol. VIII, No. 4, pp. 413-414. Cambridge (Boston) Mass, Dec, 1910. **693**

For the past two seasons, the young pines, growing in the National Forest at Halsey, Nebraska, have suffered severe injury through the ravages of the Pine-tip moth.

United States: Nebraska

The larvae of the latter attack the young shoots of the trees, causing them to turn brown and die. The principal parasites of the insect are, a black Ichneumon, a Calchis, and an entomophilous fungus, of a species which is at present undetermined.

***Hylobius Abietis* and *Megastimus spermatrophus*.** Foes of the Douglas Fir. See No. 495 in this *Bulletin*. **694**

Great Britain: Scotland

T. E. LYNDNER. **Damage to Chestnut Telephone and Telegraph Posts by Wood-boring Insects.** — *U. S. Depart. of Agr.* Bureau of Entomology, Bull. No. 94, Part I, pp. 1-8. Washington, Dec. 31st 1910. **695**

In certain parts of the United States, serious damage is being done to the bases of chestnut telephone and telegraph poles by *Parandra brunnea* Fab. (Spondylidae).

United States

The larvae of this beetle make long irregular galleries in the heart wood, the greatest damage being done to the area just below, and just above the surface of the ground.

As prophylactic remedies are suggested; the impregnation of the poles with creosote, and brush treatments with creosote, and with S. P. E. carbolineum.

696 C. SASAKI. **The Life History of *Trioza Camphorae* n. sp. Parasite of Camphor Tree.** — *Journal of the College of Agriculture.* Imperial University of Tokyo, Vol. II, No. 5. pp. 277-285, 2 coloured plates. Tokyo, October 31st 1910.

Japan: Formosa

The description of a new species of the genus *Trioza*, *T. Camphorae*, which is usually found on the camphor trees grown on the main island of Japan, Shikoku, Kiusiu as well as on Formosa, and in S. China, etc.

The insect does great injury to the above trees under all sorts of cultivation, but its ravages do not extend higher up the trees than 9-10 ft. from the ground.

The winged females appear abundantly in April, and deposit their eggs, either singly or in groups, on the under surface of the young tender leaves.

The larvae, after their first moult, thrust their filamentous mouth organs deep into the tissue of the leaves, and begin to suck up nourishment.

At the same time, the upper surface of the leaf below which the larva rests is slightly elevated into an imperfect gall, at first greenish yellow in colour, with a reddish dot in the centre, and later red.

In June, these galls have attained a diameter of 2-3 mm., and the swollen ventral surface of the larva occupies the cavity of the gall, the flattened dorsal surface closing up the opening.

The larvae begin to pupate about the end of June; the galls become finally black, but their opening is still closed by the dorsal surfaces, on which are situated clusters of white waxy filaments. In this condition, the insect passes the winter, and the adult form appears in the following April.

Most of the infested leaves fall off, and the growth of the tree is more or less affected, and, in the case of young individuals, death sometimes results.

Preventive measures:

1) All fallen leaves, whether infested or not, should be collected and burnt, or else used for the preparation of camphor;

2) If any trees are much attacked, they should be cut down, regardless of their age, and the camphor extracted;

3) The treatment of infested leaves with a 1 or 2 % solution of whale and herring-oil soaps, is very efficacious.

697 A. MAUBLANC. **Eelworms (*Anguillulidae*) which Destroy Sugar Cane.** See No. 613 in this *Bulletin*.

Java

Chr. WENZEL. **Diseases of Chrysanthemums due to Eelworms.** (Die Aelchenkrankheit der Chysanthemum. — *Möllers Deutsche Gärtner-Zeitung*, No. 6, p. 68. Erfurt, 11 Februar 1911. **698**

Attention is drawn to a serious disease which affects chrysanthemums and which has only been known for two years.

The cause of the malady is a small eelworm, *Aphelenchus olesistus*. **Germany**

The lower leaves of the plants are invaded by irregular black patches, which begin at the border; these patches rapidly extend over the whole plant, and in some cases, no single leaf escapes.

The disease affects chrysanthemums grown in pots, as well as those cultivated in flower beds; the plants often do not blossom at all, or in any case, the flowers àre so much deformed, as to be worthless.

Wet summers being favourable to the nematodes, it seems likely that the chrysanthemums would suffer less in dry seasons, but this remains to be proved.

Other pests.

C. HART MERRIAM. **The California Ground Squirrel. *Citellus Beechyi, C. Douglasi, C. Grammurus.*** — *U. S. Depart of Agric. Bur of Biological Survey.* Circular No. 76, pp. 1-16. Washington, Nov. 25th, 1910. **699**

In the United States " Ground-Squirrels " (*Citellus Beechyi*) cause losses to agriculture amounting to upwards of 10 million dollars per annum.

Besides causing great destruction of grain, nuts, fruit and other crops, these animals are carriers and disseminators of bubonic plague, therefore the checking of their increase has become a matter of national concern. Another source of damage is their habit of burrowing in embankments, dykes, levees and roadways. In irrigated districts, their underground tunnels frequently cause breaks costing large sums to repair. In May 1910, their burrows occasioned such a serious wash out in the Turlock Canal in Stanislaus County, that the line of the canal had to be changed at a cost of 25 000 dollars, while the damage caused to lucerne and other crops, by want of water at the time it was most needed, amounted to half a million of dollars at least. **United States**

Among the means of destruction which must not be lost sight of, is the encouragement of the squirrel's natural enemies—especially coyotes, badgers, foxes, bob cats and the golden eagle.

The simplest, most effective, and least expensive way of destroying the rodents, is to kill them with grain poisoned with strychnine. Barley is preferable for this purpose to wheat, as it is less likely to be eaten by birds. The barley is coated with the following solution:

Strychnine sulphate . .	1 ounce
Sacchaiine	1 teaspoonful
Starch	1/2 teacupful
Water	1 1/2 pint

This mixture is poured over the grain, which is allowed to dry; 170 lbs. of this poisoned barley were sufficient to treat from 200 to 300 acres, at a cost of 3 cents per acre. The results have always proved most satisfactory.

700 R. J. Lindo. **Woodpeckers and Bananas, etc.** — *Journal of the Jamaica Agricultural Society*, Vol. XIV, No. 11, pp. 421-422. Kingston, Nov. 1910.

Jamaica

These birds attack, not only the trunks of the trees in Jamaica, but also devour large quantities of oranges and bananas.

They have therefore been put upon the list of the farmer's enemies, and the necessity of destroying them is insisted upon.

701 P. Lesne. **A Natural Cause of the Destruction of Slugs.** (Sur une cause naturelle de déstruction des Limaces). —*Journal d'Agric. pratique*, No. 6, p. 188, Paris, Febr. 9, 1911.

France

An examination of a large number of dead, dried up slugs recently found in a garden, showed that they had not succumbed to the attack of a parasite, but had been killed by sudden atmospheric changes. A damp warm period, had been followed by a sharp North East wind, and the slugs had been frozen where they lay.

Probably, sudden frosts during the course of the winter often destroy these pests.

Legislation for the Protection of Plants.

I. Ritzema Bos. **Organisation of the Phytopathological Service in Holland.** — *De Phytopathologische Dienst in Nederland,* 702

Holland

The phytopathological service has been reorganised in Holland in accordance with the Law of March 29th, 1909, which instituted a double service: special and general.

The object of the first is the rigorous control of Dutch Agricultural products, and especially garden produce, which are intended for exportation. Each consignment must be accompanied by a certificate of the Director of the Phytopathological Institute guaranteeing the absence of injurious insects and cryptogamic diseases. When making the consignment, however, goods are often sent off under cover of this certificate which have not, as a matter of fact, been inspected at all. Articles 3 and 15 of the Law particularly insist on the necessity of preventing abuses of this kind, and whoever desires to obtain one of these certificates must ask that an inspection be made on his ground, not later than April 1st of the current year.

It is also advisable to add to the certificate a declaration to the effect that in the place whence the products are sent there are no diseases or injurious insects, such as the *Liparis chrysorrhaea*, for instance, which is with reason greatly feared in America. In practice, the exact determination of the source of the produce is not very easy. A purveyor sometimes supplies, in addition to his own merchandise, produce which comes to him from various localities. A numerous staff of specialists engaged to pay frequent visits under the direction of the Phytopathological Institute, to the most important production centres, is therefore necessary.

The certificates must further mention the quality of the goods, and the following classification has been adopted for this purpose: 1) Box; 2) Conifers; 3) Trees with persistant leaves (*Prunus Laurocerasus*, *Aucuba*, *Ilex*, etc.); 4) Trees; 5) Bushes (Currants, etc.); 6) Fruit Trees; 7) Rose bushes; 8) Perennial grasses; 9) Bulbs and Tubers.

The object of the Special Phytopathological Service is therefore to guarantee Dutch agricultural products to the foreigner, and to preserve the high position which they have made for themselves on American markets. The beneficial action of this service is recognised in the following declaration, made in July, 1909, by Messrs. H. A. Surface (Econ. Zoologist) and Enos B. Engle (Nursery Inspector):

"We have pleasure in declaring that, almost without exception, the consignments of nursery plants from Holland have arrived with a certificate in due form, signed by the Government Inspector, and that up to the present none of the plants sent from Holland to the United States appear to be infected either by the Brown Tailed Caterpillar or any other insect.

"The only importations on which the above mentioned insect has been found were from France or Germany, and this fact alone should suffice to make importers observe the greatest care when ordering foreign plants, especially from the two last-mentioned countries."

The General Phytopathological Service organises the control of injurious insects and cryptogamic diseases. The correspondents of the Institute send information as soon as one of these enemies of agriculture appears, and specimens, and the Institute sends special commissions to the spot to take all necessary measures for combating the pest,

The invasion of the *Sphaerotheca mors uvae* which occurred in Holland in 1909 clearly shows what might be done by such an organisation as this Service.

703 DELBRÜCK. **The Action of the German Government in the Control of Enemies of the Vine.** (Die Deutsche Reichsregierung zur Bekämpfung des Rebschädlinge).—*Deutsche Wein-Zeitung*, p. 858, Mainz, 12 Dez. 1910.

Germany

During the Sessions of the Reichstag on Dec. 1st and 2nd 1910, the question of the control of the enemies of the vine was under discussion.

The following is an extract from the speech made on this occasion by Dr. Delbrück, Secretary of State.

After Peronospora and Oidium, the chief foes to vine-culture in Germany are *Eudemis* and *Cochylis* (Heu und Sauerwurm). But while in sulphur and cupro-calcic mixtures, efficacious remedies have been found against the first two pests, nothing is so far known, in spite of many experiments, which can be relied upon to destroy the two last.

The Government offered a prize of 2500 marks or £123 to anyone who should devise a speedy and sure method for the destruction of Cochylis and Eudemis.

But no one has, so far, been able to claim the reward.

The Royal Bavarian Institute at Neustadt a. Haardt and the Royal Prussian Institute at Geisenheim are both studying the question.

The Prussian Government has tried to solve the problem by means of systematic experiments with chemical preparations.

In 1908, in those Prussian vineyards (Domänen Weingüter) where no precautions had been taken, the crop was only 9.8 hectolitres per hectare, while the yield of a similar area where energetic measures had been enforced (nightlamps and adhesive papers) amounted to 31.65 hectolitres.

The best way of combating Cochylis and Eudemis, which has yet been found. in the districts of the Rhine, Mosel and the Bavarian Palatinate, is to carry out the campaign in the winter.

At this season, only the larval form is in existence.

The government of Bavaria have made winter measures obligatory, and have announced that such proprietors as neglect these precautions are liable to punishment, and that the necessary steps will be taken by the authorities, but at the owners' expense.

The summer campaign, which consists of treatment with tobacco juice is not ineffectual, as has been proved by the experiments carried out under the direction of the biological Institute at Dahlem.

In order to minimise the expense, the Government has taken the tax off all tobacco used in the preparation of insecticides, and has reduced the duty on imported extracts, as the latter are more efficacious than those prepared from German tobacco.

The Government has also taken measures for the protection of birds, which are man's natural allies agaist parasitic insects.

Measures Officially Recommended for the Control of Cochylis and Eudemis in Württemberg. (Amtliche Vorschriften zur Bekampfung des Heu- und Sauerwurms in Wurttemberg). — *Weinbau und Weinhandel*, 29 Jahrgang, No. 5, Beilage. Mainz, 4 Februar 1911. **704**

Germany: Württemberg

The Ministry of the Interior of Wurttemberg published on Dec. 27th 1910, an Order, relative to the control of Cochylis, in the following terms:

1) In conformity with article 33, paragraph 1, No. 2, and article 51, paragraph 1, of the law concerning rural police regulations (Landpolizeistrafgesetz) of Dec. 27th 1871, the following measures have been passed:

In all vine plantations (whether in the form of vineyards, nurseries, gardens or trellises) destined to produce grapes for the table, or for wine-making, or even only serving an ornamental purpose, it is necessary to scrape the old wood directly after the vintage, or at latest, at the time of spring pruning.

2) The new poles should be stripped of bark before use.

3) The straw and osiers used for tying, should afterwards be burnt.

4) The fallen branches, poles, trellises, etc. should be removed from the plantations before May 1st. It is forbidden to stack this material near vineyards.

5) At vintage time, at latest, dead fruit, or any attacked by Cochylis, should be collected in special receptacles, and destroyed.

6) Owners, or tenants, are held responsible for the execution of the orders contained in these regulations respecting vine-plantations.

7) Exceptions may be made, at the option of the central Office, with regard to paragraphs 1 to 5, in such districts as are free from the insect.

8) The local police, aided by persons specially appointed, will see that the regulations of paragraphs 1 to 5 are enforced.

The ministerial decree of March 1st 1907 respecting the control of Phylloxera appointed special commissioners for the superintendence of the different districts (Gemeindebegirk).

These commissioners are appointed to enforce the above regulations, and to give notice of any neglect on the part of those persons engaged in exterminating Cochylis.

705 **Control of Cochylis and Eudemis in the Rhine Palatinate.** (Bekampfung des Traubenwickleis in der Rheinpfalz. — *Allgameine Wein Zeitung*, XXVII, No. 48, pp. 515-516. Wien, 1 Dez. 1910.

The Bavarian government has promulgated the following regulations with regard to the control of Eudemis (Sauerwurn) and Cochylis (Heu-wurm).

Germany: Rhine. Palatinate

The destruction of the larvae of these insects in winter, is made obligatory for all owners, tenants, usufructuaries, or their representatives, and must be carried out in all vineyards or plantations of vines, including those on houses or in gardens.

Every year after the vintage, the old wood must be cleaned by scraping or brushing, if it is not entirely covered with soil.

The earthing up should be done before Jan 1st, at latest, the scraping and brushing before April 1st. The wooden vine-poles and supports of all kinds, are to be freed from all larvae which have got into the crevices, or varnished over with some adhesive and resistant compound. All moss growing in the vineyard must be removed.

The above operations must be concluded by April 1st.

All the straw, or osier or cloth bands, as well as any remains of grapes, must be collected and burnt by April 1st, at latest.

The branches which have been pruned off, the pieces of wood which have fallen from the old poles, trellises, etc., should be removed from the vineyard and burnt before April 1st.

It is forbidden to keep the above rubbish in the neighbourhood of the vineyard.

During the vintage, or immediately afterwards, all withered and unripe grapes should be cut off the stocks, collected in a special receptacle, and treated in such a way as to disinfect them.

It is hoped that by strict enforcement of the above police regulations an end will be put to the devastations of these pests, which have, for years, caused great damage in the Rhenish Palatinate.

Legislation on Control of Locusts in Spain. — *Gaceta de Madrid*, Año CCC, tomo I, No. 43, pp. 429-430. Madrid, 12 Febrero 1911. 706

Spain

A royal decree commands the following regulations to be observed for the control of locusts in Spain:

1) The civil governors of Albacete, Almeria, Avila, Badajos, Caceres, Cadix, Canarias, Ciudad Real, Cordova, Cuenca, Helva, Jaén, Leon, Madrid, Malaga, Salamanca Seville and Toledo, are instructed to oblige all owners of land which is infested with locusts, to carry ont carefully the regulations set forth in the law of May 21st with regard to the "roturaciones" of the land. In cases in which the owners neglect these measures for the extermination of the pest, the local preventative Commission must carry them ont, according to art. 64 of the above law.

2) The chief engineers of the Agricultural Sections in the above enumerated provinces, assisted by a technical staff placed at their disposal, must superintend the proper carrying ont of the measures for extirpating the pests, and must furnish a list of immune districts, and of those where the prescribed regulations have not been observed. Their report will be forwarded to the governor, who reserves to himself the right of dealing with the matter according to art. 79.

3) The head of the Agricultural Section will have the entire technical direction of the campaign.

5) The Minister expects that the decree will be scrupulously observed, and demands the greatest activity on the part of the staff, in order that the evil may not break ont with renewed vigour at the beginning of spring, owing to any negligence or carelessness.

Federal Insecticide Regulations. — *The Ohio Farmer*, Vol. CXXVI, N. 27, pp. 6-610. Cleveland, Ohio, Dec. 31, 1910. 707

United States

The Insecticide Act of 1910 came into force on January 1911.

The act forbids the manufacture or sale in federal territory of adulterated or misbranded insecticides and fungicides, especially mentioning Paris green and lead arsenate.

It also forbids traffic in such articles between one State and another and this is its most important feature.

Under the regulations, samples of insecticides and fungicides are to be bought by agents of the U. S. Dpt. of Agr. and analyzed, or examined by such chemist or examiner as the Secretary of Agriculture may designate. If a sample appears to be adulterated or misbranded, a private hearing before the Secretary or his representative will be given to the party from whom the sample was obtained and to others interested. If it still appears that the Act has been violated, the proper U. S. attorney will be informed.

Provision is made for State officials to co-operate in reporting violations to the Secretary of Agriculture.

Any insecticide or fungicide is considered adulterated if its strength or purity fall below the standard under which it is sold, or if any substance has been wholly or partially substituted for it, or if any valuable ingredient has been even partially removed, or if it is intended to be used on vegetation and is injurious to vegetation.

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The information contained in some of the abstracts dealing with Canada has been most kindly placed at the disposal of the Institute by the Government of the Dominion.

The Canadian abstracting is by Mr. J. K. Doherty, the able chief of the Canadian Bureau of Correspondence with the International Institute of Agriculture.

AGRICULTURAL INTELLIGENCE

NB. The Intelligence contained in the present Bulletin has been taken exclusively from the books, periodicals, bulletins, and other publications which have reached the Library of the International Institute of Agriculture in Rome during the month of March 1911.

The Bureau assumes no responsibility with regard to the opinions and the results of experiments outlined in the Bulletin.

The Editor's notes are marked [Ed.].

Development of Agriculture in Different Countries. — Scientific Institutions — Education in Agriculture and Forestry. — Experimentation. — Congresses — Rural Economy.

WOHLTMANN. **Agriculture in Germany and in the German Colonies.** — *Deutsche Kolonialzeitung*, N 7-18, p .107. Berlin, Feb 1911. 708

Germany has an annual consumption of agricultural produce to the value of 16 thousand million marks, or £ 800,000,000; Germany herself produces three quarters of this amount and imports the other quarter, (worth £ 200,000,000). One eighth of the imported produce is supplied by tropical or sub-tropical countries. Besides this, Germany imports forage to the value of about £ 250,000,000.

The demand for colonial produce is equal to 25 shillings per head per annum. To reduce foreign importation, Germany must develop agriculture in her colonies, and reclaim her wastes and moors. It is calculated that about 2 ½ million hectares are available in the colonies for the cultivation of produce for German markets. The following measures are suggested:

Germany: German Colonies

1) The introduction in German High Schools of Agriculture of the study of tropical and colonial agriculture;

2) The institution of an Agricultural Section in the Imperial Colonial Office, with the special object of supplying the country with such produce as will not grow in the German climate;

3) Greater importance must be given to agriculture in the colonies, and technical bureaus should be instituted in each Government for the agricultural requirements of the colony;

4) The number and importance of the agricultural stations should be increased in the colonies;

5) Practical agricultural instruction should be given to the natives of the colonies.

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Austria Hungary Bosnia Herzegovina

GIACCHI (Italian Consul, Serajevo). **The Natural Resources of Bosnia-Herzegovina.** (Le risorse naturali della Bosnia-Erzegovina). — *Boll. della Società geogr. italiana*, N. 3, p. 392-396. Roma, marzo 1911.

The only land suitable for cultivation in Herzegovina is in the *polje*, which are extensive Carsic depressions. The cultures range according to altitude from corn to tobacco, and to the vine, which is grown around Mostar.

With the exception of the Adriatic slope, which presents the same characteristics as Herzegovina, conditions in Bosnia are more favourable to the cultivation, both of cereals and of fruit trees. Cattleraising is also prosperous.

Forests of pine, oak, beech and hornbeam cover a surface of 2 572 664 hectares, and yield annually 212 000 cubic metres of pine 40 000 c.m. of oak, and 225 000 c. m. of beech.

The chief cereals cultivated are *Dervent* wheat, barley, maize (*kukurucz*), oats, millet, rye and buckwheat, maize alone yielding half of the total cereal production. Among introduced cultures are potatoes, hops and sugar-beet of these last, 450 000 quintals are used in a season for the sugar refinery at Usora.

Plums are produced in great quantities and are largely exported as prunes.

Vineyards cover about 6 600 hectares, and their yield has risen from 27 000 metric quintals of grapes in 1882 to 84 000 m. quintals in 1908. Tobacco, of excellent quality (the tobacco of Herzegovina is famous), yielded 42 023 quintals in 1900. In 1910, 122 644 440 plants were counted.

Native races of cattle are numerous, but of no great value. The Government is about to introduce stallions from Arabia and Syria with a view to improving the breeds of horses. The native oxen do not weigh more than 350 kg. The native sheep have been crossed with *Buccara, Caracul, Moldavian* and with English breeds.

Sericulture, bee-keeping, hunting and fishing contribute in a small way to the industries and trade of the country,

710

ROBIN (Acting French Consul at Syra). **Agriculture in Syra, Cyclades.** (Mouvement commercial, industriel et agricole de Syra, en 1909). *Rapports commerciaux des agents diplomatiques et consulaires de France,* 1911, N. 932, p. 23. Paris, 23 fév., 1911.

Greece: Cyclades

Cultures in the Island of Syra, one of the Cyclades, consist chiefly of early market vegetables, of which a large portion are exported to Athens and to Turkey. Grain crops are not grown, except some barley for local consumption. The production of figs, citrus fruits, olives, grapes and raisins, almonds and other fruit is not sufficient for the needs of the population, some of these products being imported from the neighbouring isles. Wine is also imported from Santorin, Tinos and Paros, the produce of the Syra vineyards being consumed in the form of grapes and raisins.

Cattle and sheep are scarce and have to be imported. Goats are numerous, as in all mountainous countries. Poultry are common.

Fishery is one of the most paying industries of Syra.

Another important industry is that of citrons in salt, the fruit for which purpose is imported from the different isles of the Archipelago, especially from Naxos, and also from Crete, Syra having the monopoly of the salted product.

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ZARZECKI (French Consul). **Agriculture in Macedonia, Turkey.** *Rapports Commerciaux,* N. 927. Ministère du Commerce et de l'Industrie. Paris, 1911.

Ottoman Empire: Macedonia

Macedonia may be considered as an entirely agricultural country, its exportation products being exclusively agricultural. The soil is naturally very fertile, but could be rendered far more productive, as the methods of cultivation are still very antiquated. There are signs, however, of a tendency to progress, and if the present peaceful conditions continue, there is hope that the productivity of Macedonia will increase.

A good deal of silk is produced but the methods employed are primitive, artificial incubation being rarely practised. The average production is 400 000 kgr. of cocoons, of the value of about 4 000 000 francs (£ 160 000). The greater part of this produce is sent to Italy.

Macedonian cotton, about 1 800 000 kgr., is spun in the country. Opium production is increasing, for both opium and poppy seeds are easily sold at good prices.

Macedonian skins are much valued in European and in American markets, and furnish an important trade. These skins are of lambs, kids, deer, sheep, goats, foxes and hares. This exportation, in 1909, amounted to 4 300 000 francs, (£ 172 000) the skins being chiefly bought by Austria, and also by Germany.

In Macedonia, the production and exportation of cereals has never been important. In the best years, this exportation has not risen above 10 000 000 francs. The trade in eggs is very active. Tobacco culture is extending in Macedonia, where the soil seems particularly favourable to this product. Tobaccos from Drama, Xanthia and Cavalla are in request on foreign markets. The tobaccos of Cavalla, Serres, Zihua, and partly those of Drama are traded under the name of *basma*, i. e. "pressed". The vilayet of Salonica is the district in Macedonia of greater importance for the production of tobacco. In the vilayet of Monastir, the tobacco is of inferior quality, unadapted for exportation. The tobacco from the vilayet of Kossovo is more abundant and of better quality, but is smuggled in large quantities, especially in Albania, so that only a third of the total production is bought by the Ottoman Tobacco Monopoly, or by exporting merchants.

712 **Agricultural Possibilities on Islands of the Northern Territory of Australia.** — *The Board of Trade Journal.* No. 736, p. 37. London, January 5, 1911.

Australia: Northern Territory

Thirteen islands adjacent to the mainland of the Australian Northern Territory were thoroughly examined, and the soil of the majority of them was found to be suitable for agriculture. On South Goulburn Island, which has an area of 30 square miles, a piece of country round a large sheet of fresh water is eminently suitable for growing rubber, sisal hemp, coco-nuts, pea-nuts and cotton. Indeed, cotton of good quality of the Sea Island type was found growing wild there. The greater part of the Island is suitable for stock rearing or sisal hemp cultivation.

Croker Island, with an area of 126 square miles, contains a large area of land suitable for the cultivation of upland rice, ceara rubber, tobacco, coco-nuts, cotton and sisal hemp.

718

LANGGUTH (Austrian Consul at Auckland). **The Development of Agriculture in New Zealand.** — *Jahresbericht des k. k. Konsutates in Auckland für das Jahr* 1909. *Berichte der k. k. Öster-Ung Konsulär-àmter.* 1910. Wien, Febr. 1911.

New Zealand

Although industry is growing rapidly, agriculture will long remain the chief source of wealth for New Zealand. The fertility of the soil and the favourable climate lead to an increasing agricultural exportation. Cereals of all kinds, peas, beans, flax, clover, are generally cultivated. Among forage seeds, those of cocksfoot [*Dactylis glomerata*], and of rye-grass [*Lolium perenne*], are of special importance.

The following are the total productions of grains in the last harvest:

Wheat	8 783 098	bushels
Oats	13 526 870	„
Barley	1 227 757	„
Rye-grass	1 547 912	„
Cocksfoot	5 185 310	„

The potato yield was 192 484 tons.

New Zealand flax [*Phormium tenax*] grows spontaneously in marshy ground, and only recently its cultivation has been tried. Notwithstanding the efforts of Government, which has offered very high premiums, the industrial transformation of New Zealand flax has not yet succeeded; there is, however, a yearly exportation of about 16 000 tons of this product.

Fruit culture is developing rapidly, the orchards having an area of some 15 000 hectares, with a value of 25 000 000 francs (£ 1 000 000). All kinds of fruits can be grown, especially apples, pears and cherries. The exportation of apples to Great Britain increases slowly, because of Tasmanian competition. Fruits that cannot be exported are used for jams.

Vineyards extend over 663 acres of which 494 are in the provincial district of Auckland. An acre yields about 50 gallons of wine. These wines are light but good.

Sheep-rearing is the great industry of the country; in 1881, the number of sheep was 12 190 215; on the 30th April, 1910, this number had risen to 23 792 947. In this interval, the total number of sheep-breeders rose from 8 631 to 20 693, the average number of sheep in each flock having decreased from 1 685 to 1 085 (1).

The sheep are raised principally for wool; the wool of merino sheep averages about 6 lbs. per head, and that of the cross-breeds 8 lbs. All the meat exported is examined and classified by Government inspectors.

The cattle pastures are less extensive than those for sheep, but as the production of butter and cheese is found to be a paying industry, the numbers of cattle increase, and amount at present to 1 773 326 head, of which 536 629 are milch cows. The use of milking machines is gradually spreading among farmers. Cheese and butter are made on an industrial scale in large cooperative dairies, so that a constant type and superior quality are produced. In April, 1910, there were in New Zealand 189 butter factories and 194 cheese factories, besides 276 private dairies of less importance.

The Dairy Industry Act, 1908, prescribes regulations against frauds, and methods for the graduation of milk.

The total production of butter is estimated at about 250 000 metric quintals, of which 170 000 quintals are exported. Of a total production of about 230 000 quintals of cheese, 215 000 are exported and the condensed milk industry is increasing.

Large draught horses are bred entirely from the Clydesdale stock and are exported to Australia. These horses number about 363 259.

There are about 245 000 pigs, bred chiefly in connection with the butter and cheese factories.

The few goats (2494) are Angoras, recently imported by the Government.

Model poultry farms have been established by the Government, which has also introduced the raising of ostriches. On one farm there are 500 ostriches; they are left in liberty during the day and sheltered at night. The feathers are gathered twice a year.

Although the conditions of the country would be very suitable for bee-keeping, there are at present only 74 341 apiaries.

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(1) Cf. Bulletin of Nov. 1910, p. 126, and Jan. 1911, No. 221. [*Ed.*]

714 G. D. N. HAGGARD. (British Vice Consul at Guatemala) **Unexploited Agricultural Products in Guatemala.** — *The Board of Trade Journal*, No. 748, p. 676. London, March 30, 1911.

Guatemala

Many products of the soil of Guatemala, in which at present there is no foreign trade, might be exported. Whether from ignorance of the market value of the products, lack of capital to exploit them, or failure to get in touch with purchasers abroad, the local owners of estates do little to increase their productiveness. As an instance may be mentioned the " Colume " or *Manacca nut*, locally known as the " Coroza ", which grows in great abundance in the valleys of the Polochic and Motagna, and is valuable for its oil. It is excessively hard, and no practical machine for cracking it has yet been invented. Small portable machines, which could be carried about from tree to tree, would be the most useful. *Mystrina Wax* is produced in the department of Suchitipequer from a nut, and is used in the manufacture of soap; the fruit itself might also be exported in glass bottles or tins. Among other products of the forests as yet unexploited, such as gums, resins, fibres, etc. may be mentioned a certain wood found in the Province of Petén, much prized for its buoyancy and said to possess advantages over cork.

Rubber also might be cultivated on a far larger scale if the numerous estates, on many of which wild rubber grows in great quantities, were in the hands of persons with capital and knowledge. The native owners, for the moment at all events, seem more disposed to sell these lands than to work them, but do not know how to get in touch with a purchaser. With the completion of the railway system in the west of Guatemala, and the consequent outlet to the Atlantic by way of Mexico, some of these estates might prove a good investment.

715 LA VAISSIÈRE and CUFINO. **Agricultural Production in Martinique.** (La produzione agraria della Martinica). — *Bollettino della Società geografica italiana*, N. 2, p. 277. Roma, febb. 1911.

Martinique

Martinique produces almost all the tropical fruits: guavas, mangoes, pineapples and bananas. The commercial products are especially sugar-cane, cacao, coffee and vanilla. Sugar-cane gives an average annual production of 35 000 tons. The coffee tree, which is pruned in umbrella shape, grows to a height of 8 metres. The culture of tobacco, indigo and ginger has just been successfully introduced. The principal starch-producing plants cultivated are the manioc, the yam, and arrow-root, which is also extracted from the rhizomes of several different plants.

Cattle are little raised in the island, and have to be imported from Porto Rico and Venezuela.

716 GRANVILLE FORTESCUE. **The Galapagos Islands.** — *Bulletin of the Pan-American Union.* Vol. XXXII, No. 1, pp. 222-239. Washington, February, 1911.

Ecuador: Galapagos

The resources of the Galapagos Islands can be summarized as follows: wild cattle, found in large numbers on several of the islands, especially Albemarle, where it is estimated that their total number is about 40,000; the Galapagos, or land turtle, which is unfortunately rapidly diminishing in numbers; the orchilla (*Roccella tinctoria*) (1), no longer as valuable as in former years; donkeys, of which 20 000 fine specimens are roaming wild on James Island; seals, still found in great numbers on most of the islands; fisheries; and the possibilities of the extensive cultivation of sugar-cane and other agricultural and horticultural products. Citrus fruits thrive wonderfully in this climate and coffee has been cultivated with success.

There are a number of sulphur deposits, as might be expected in volcanic formations.

The turtles yield a peculiar quality of oil that can be used in place of lard. A medium-sized turtle yields from 5 to 6 gallons (22.7 to 27.3 litres) of this product, worth about 75 cents gold per gallon (1.15 francs per litre) and as it is easily extracted, the turtle hunters are gradually exterminating this remarkable reptile. The dogs that roam the islands have also contributed to the destruction of the turtles. A turtle has sometimes measured more than 3 feet (about 1 metre) in length and weighed as much as 600 pounds (271.8 kg.), but these giants are very rare nowadays.

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(1) *Roccella tinctoria,* commonly known as *Dyer's moss,* is a lichen from which certain dyes, such as Archil, Orcine, and Litmus are extracted. [*Ed.*].

The islands are seal-rookeries of considerable importance. The seals of the *Otaria jubata* species frequently grow to the size of a bull, but there is also a smaller species, which averages about 5 or 6 feet (1.52 or 1.83 metres) in length.

José Vicente Arche. **Present Conditions and Possible Reforms of Agriculture in the Riff.** (Memoria acerca del estado actual de la agricultura en el Rif, y reformas posibles é immediatas qui conviene implantar). — *Direccion General de Agricultura, Industria y Commercio*, pp. 1-8, Madrid, 1910. 717

Morocco: The Riff

The climate of this region is dry, although the temperature is not very high, 18.2° C. being the average during the period 1904-08. Rain is rare and unequally distributed in the seasons.

Spring	85 mm.	(in 10 days)
Summer	8 „	(„ 3 „)
Autumn	115 „	(„ 12 „)
Winter	125 „	(„ 11 „)

The cultivation of cereals is therefore not remunerative, the yields giving an average of 20 hectolitres per hectare. Pomegranates, oranges, figs, and especially olives flourish in this region.

This low condition of agriculture is due to the primitive methods of cultivation, to the deficiency of means of communication, and to the indolence of the natives.

Nor is cattle-raising more prosperous; the draught oxen are small and few, and the herds of sheep and goats scarcely furnish sufficient meat and wool for the inhabitants.

The writer points out the expediency of establishing an Agricultural Experiment Station in Nador, for the purpose of improving agricultural methods, of introducing modern machinery, of distributing seeds of good quality, and of encouraging in every possible way the agricultural improvement of the Riff.

Agriculture in Fernando Po. (Los territorios españoles del Africa Occidental). — *España Economica y Financiera*, N. 938. Madrid, 25 de Febrero de 1911. 718

Spanish West Africa: Fernando Po

The new plantations made within the last few years in Fernando Po are 541, covering 9335 hectares, of which 6 600 are planted with cacao, 600 with various cultures, and 2 135 with forest. Cacao gives the highest production and coffee yields only 4 628 kgr.

The agricultural exports from the five ports of the colony reach a total of 4 241 tons, representing a value of 2 397 410 *pesetas* (1). More than half of the total was exported from the port of Santa Isabel.

719 ARMSTRONG (British Acting Consul at Boma). **Agricultural Resources of Uele District.** — *The Board of Trade Journal.* No. 748, p. 658. London, March 30, 1911.

Congo: Uele District

The Uele Districts is divided into four zones, the Rubi, the Uere-Bili, the Bomakandi and the Gurba-Dungu. Of these four zones, the Rubi and the Bomakandi are the richest in rubber, while all the northern part of the latter is non-rubber bearing. The Rubi zone consists wholly of dense equatorial forest; while the Bomakandi is forest intersected with grass plains, the south-western parts forming the fringe of the great forests of the Aruwimi Ituri and Itimbiri basins. The Uere-Bili is chiefly grass plain, with strips of rubber-bearing forests along the numerous water courses intersecting the country. The Gurba-Dungu zone has few resources.

With the exception of the Gurba-Dungu zone, the soil in the Uele district is exceptionally rich. Desides the ordinary African food, such as bananas, plantains, manioc, palm-oil, maize, etc, rice, pea-nuts, millet, sorghum, potatoes, sesame oil grow in abundance.

The quality of the maize where the seed is carefully selected is said to be as good as that of the best American grain. The plains in areas where there is no tse-tse fly afford good grazing for cattle.

720 WALLACE. **Science and Rubber Production.** — *The Times* (Finance, Commerce and Shipping), p. 24. London, February 7, 1911.

Brazil. Malay States. India.

Science is capable of doing much for the rubber planter in competition with the wild rubber collector, not only in the manufacture of the products, but in the cultivation and preservation of his trees, and in safeguarding the lives of the workers. It is estimated that in the Amazon valleys the collection of every ton of rubber costs two human lives. Work has to be suspended altogether for the three months — January, February and March — when the rivers are at their greatest height and when the conditions generally make it impossible for the employés of the Portuguese and Brazilian companies, which control the work of collection, to operate. In the Malay States, on the low-lying plantations where malarial fever might be expected to lurk, control has been got of this dreaded enemy of the rubber collector, and the annual death-rate among coolies in many instances has been reduced to 10 per 1000. But a new phase of the fever difficulty has arisen which was one of the chief reasons why the Government of India not long ago stopped the supply of indentured coolies to the Malay States.

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(1) The peseta of 100 centesimos is of the value of one franc, 9 ½ pence, or 25.225 pesetas to the pound sterling, but the actual value is about 7 ½ pence. *The Statesman's Year-Book,* 1910, p. 1228. [*Ed.*].

A new variety of fever-bearing mosquito has been found, which breeds in running water, in the streams or rivulets discharging from the elevated ground; and so disastrous has the effect been that the annual death-rate of coolies working on plantations situated in hilly country has in some instances risen to 300 per 1000. Medical and sanitary authorities are at work experimenting how best to overcome the difficulty. A system of covered drains is thought to be the most practical effective means available; and it is being determined whether the covering up of the sources of the streams by a system of closed drains is sufficient, or if the covering must be extended all the way to the flat land below.

The Work of the Agricultural Department in Grenada. — *Agricultural News*. N. 229, p. 39, Barbados. Feb. 4. 1911 **721**

Windward Islands: Grenada

Experiments in the hybridisation of cotton varieties have been undertaken in the Botanic Garden of Grenada. Researches have also been made on the germination of *Hevea* seed. Another matter of interest has been a practical enquiry as to the possibility of growing green-manuring crops under the shade of cacao. This has not yet been concluded. Among the plants tha thave been tried or established are alfalfa, varieties of pine-apples, onions, the Bambarra ground nut (*Voandzeia subterranea*), the Guayule rubber plant (*Parthenium argentatum*), Soy bean (*Glycine hispida*), the Perini fibre plant (*Hibiscus *radiatus*), and one or two varieties of pasture grasses. The question of making Jippi-jappa hats was recently brought before the Economic Committee. 500 roots of the plant used for making the hats (*Carludovica jamaicensis*) have been ordered from Jamaica, and are expected to be available shortly for planting.

722 **Belgian Congo** **Agricultural Administration in Belgian Congo.** (Service de l'agriculture du Congo Belge). — *Bulletin Officiel du Congo Belge.* 4e année, N. 2, pp. 89-92, 10 février, 1911.

The Minister for the Colonies has issued regulations, dated January 18, 1911, regarding the Agriculture of Belgian Congo, dividing the colony into 5 agricultural districts. The State agricultural institutions include: 1) Agricultural and Breeding Stations; 2) Stations for Research; 3) Industrial plantations. The conservation of forests, agricultural hydraulic works and reclaiming of land will be the work of special departments.

Each district is placed under an agricultural official (*Agronome*) depending directly from the Director General of Agriculture, and assisted, according to circumstances by one or more district agricultural officials.

723 **Agricultural Instruction for Women in Italy.** (Corsi temporanei di economia domestica). -- *Bollettino della Camera di Commercio e Industria di Fermo.* Anno VI, N. 2, pp. 12-14. Fermo, Febbraio, 1911.

There are not many schools in Italy where agriculture and domestic economy are taught to women. The greater number of such institutions have been founded by private initiative, and afterwards subsidised by the Ministry of Agriculture, Industry and Commerce.

The agricultural section annexed to the Royal Normal School for women at Udine was founded in 1879-80, and now supplies mistresses of agriculture to the normal schools. In 1902 a practical agricultural school for women was founded at Niguarda (Milan), for the daughters of labourers. **Italy**

The Institute of agriculture and domestic economy, founded at Florence in 1908, aims at instructing young women of the educated classes. In 1907, a school was founded at Turin, called the

School of domestic management (*Scuola della buona massaia*), and a school of domestic and agricultural education for the daughters of labourers and peasants living in the outskirts will shortly be opened at Rome.

In 1908, the first schools for domestic economy were founded in the province of Bergamo, with a view to giving domestic training to working women. The working women who follow the courses do not lose their salaries and receive gratis the dinner which they have prepared under instruction. These institutions have received great encouragement from land-owners, and directors of factories and of agricultural undertakings, and schools of the same kind are being instituted in the provinces of Turin, Milan, Parma and Brescia.

Demonstration Orchards in Quebec Province, Canada. — *The Journal of Agriculture and Horticulture.* Vol. 14, No. 9, p. 182. Montreal, Canada. 724

Canada: Quebec

The Government of the Province of Quebec has agreed to provide funds to establish and carry on demonstration orchards in several of the best fruit growing districts of the province Funds are provided under the following conditions.

That a cooperative society of at least 25 members, organized under the Cooperative Societies' Act, be formed in the community named, and that to this society a grant of $ 800 will be given for the purpose of conducting such demonstration work; the said work to be conducted under the joint supervision of the Department of Agriculture, the Quebec Pomological and Fruit-Growing Society and a Committee of the said Co-operative Society.

The intention is to use this Government money for the purpose of conducting demonstration work in pruning, spraying, fertilizing, cultivating, packing and marketing fruit. The work is to be carried on for a period of four or five years.

F. D. FARREL. **Agricultural Demonstration Train for Dry-Farming.** DROUTH YEAR PROVED VALUE OF THE SYSTEM OF DRY-FARMING. — *The Dry-Farming Congress Bulletin.* Vol. IV, No. 4, Colorado Springs. Colo.; February 15, 1911. 725

United States

The agricultural demonstration train of seven cars, sent out in the interests of dry-farming, dairying and hog-raising, by the Oregon

Short Line and Union Pacific Railroads, in cooperation with the University of Idaho and the Utah Agricultural College, recently completed the most extensive trip ever made in the Mountain States It travelled 2000 miles and visited 26 towns in Utah, 50 in Idaho and 2 in Oregon; 8500 farmers visited the train in Idaho and about 4000 in Utah.

A baggage car 60 feet long was occupied by a very fine exhibit of dry-farming products, raised during the season of 1910: the object of this exhibition was to promote the cultivation of a wider area of unirrigated lands. One interesting part of the exhibit was a chart giving results on eight representative dry farms in Utah and Idaho· This chart gave a fairly good idea, not only of what can be done on the dry lands in the mountain States, but also of what is actually being done. *The average yield of wheat per acre of the eight farms is 24.7 bushels, produced at a cost of* $ 5.95, *leaving an average profit of* $ 12.59 *per acre.*

The possibilities of dry farming are further assured by the fact that where only one year's results are given, they were obtained in 1910, the driest year on record in this section.

All the Idaho farmers listed in the chart grow Turkey wheat exclusively. The average of all the dry farms in the two States named would not give as good results as are given in the chart, but it requires only intelligent, careful work on the part of the operators to realize the profits listed or to do even better.

The speakers have insisted upon this other point, that the dry farmers should cease attempting to grow spring varieties of grain.

The winter grain varieties have averaged, during six years' experiments, more than seven bushels per acre per year above the spring grain varieties, on the same farm.

The train was furnished with an excellent exhibit of bread made from different varieties of grain; the Turkey loaf was much lighter and finer than other loaves.

In the irrigated portion of the territory, the farmers were urged to make use of dry farming methods for the conservation of moisture, the main points which were insisted upon were: the importance of a deep soil for storage water; thorough cultivation; the use of only winter grain varieties; the advantages of alternate summer fallowing; spring cultivation of grain fields wherever soil crusts.

726 K. RÜMKER, E. v. TSCHERMARK, EDLER v. SEYSENEGG. **Agricultural Instruction and Plant-Breeding in the United States.** — *Landwirtschaftliche Studien in Nordamerika mit besonderer Berücksichtigung der Pflanzenzüchtung*, mit 22 Tafel, pp. 1-151. Verlagsbuchhandlung Paul Parey. Berlin, 1910.

United States

Plant-breeding and experimental researches on heredity, as conducted in the United States, promise well for the future, both from a practical and a scientific point of view. This is especially true as regards Mendelism and the " theory of factors " in the study of the life of plants, of insects and of domestic animals.

In these researches, specialisation may appear sometimes too one-sided, but it offers the advantage of accomplishing in a few years what, in other times, was the work of generations. The interesting and original researches on the artificial isolation of " mutations " by means of external agents, of injections, etc., may soon render possible the experimental distinction between constant " mutations " and those that are variable and due to adaptation. Hitherto the best results have been obtained with maize, with wheat and with oats, little attention having been given to barley and rye.

The labours of Burbank have given special importance and originality to the researches regarding fruit-culture. The same may be said of the improvement of some grasses, as *Phleum*, of Alfalfa, of potatoes and of flowers. It may however be observed that, with the exception of some very distinguished specialists, the persons engaged in these researches are not sufficiently prepared scientifically for their work.

Agricultural instruction is of the best kind in the United States, and quite adapted to the conditions of the country, in which agricultural literature is widely developed. The Bulletins of the Washington Department of Agriculture and those of the Experimental Stations in the different States of the Union constitute a great and well-organised work, worthy of being better known and better appreciated in Europe. It would be desirable that something similar were done in Germany, and greater means and greater study devoted to agricultural problems and to the institution of new Experimental Stations. It would also be advisable to send German students to the United States, in order to study the conditions of American agriculture and the methods by which in the United States science is applied to farming.

727 **Agricultural and Manual Instruction in Porto Rico.** — *Bulletin of the Pan-American Union*, p. 86. Washington, Jan. 1911.

Porto Rico

Instruction in agriculture is offered by the University of Porto Rico at Rio Piedras, where it maintains extended courses, and by the Department of Education, in 6 of the 41 supervisory districts, where work of an elementary nature is offered. In each of these districts is a special teacher of agriculture, who gives instruction to the pupils in the graded schools and superintends the work of the rural teachers in farming subjects. Gardens are maintained in connection with the work, and in some instances the sale of the products has placed a fund at the disposal of the teacher for the purchase of fertilizers, implements, etc. Sugarcane, pineapples, citrus fruits, tobacco, and vegetables are the common products. It is hoped, that in the near future, the work may be extended through the appointment of a larger number of special teachers. Hitherto the source of such teachers has been principally the Tuskegee Institute and other agricultural schools of the United States, but the University of the Island is now in a position to meet the demand. In addition to this source of supply, the Summer Institutes maintained by the Department provide instruction for prospective teachers of agriculture, more then 170 having pursued such courses during the past summer.

In the high schools of the island and in the University, courses in manual training and in domestic science are maintained. In the graded schools courses in sewing are offered, but up to the present time, only to a limited extent.

It is hoped that funds may be provided by the legislature at its next session for the introduction of these subjects on an extended scale into the graded schools.

728 **Agricultural Education in Brazil.** — *Bulletin of the Pan-American Union*, p. 167. Washington, Jan. 1911.

Brazil

The *Diario Official* of October 27, 1910, contains the text, of the presidential Act establishing a system of agricultural schools in Brazil. The regulations provide for a course of theoretical and practical instruction in agriculture, veterinary science, stock-raising and the rural industries. The decree further provides for the establishment of an Agricultural and Veterinary High School in the Federal District, the courses of which should fit young men for positions in the Department of Agriculture, in agricultural schools and colleges, and experimental stations. Agricultural schools, teaching theoretical and practical farming, will also be established in various parts of the country, with a course of study covering a period of three years. Theoretical instruction in the class room will be followed by practical work in the laboratories and experimental farms. An apprentice system is also provided for training the children of farmers and rural labourers in the proper handling of agricultural machinery and instruments, farm sanitation, treatment and feeding of domestic animals, etc.

Biarritz Congress of the Chrysanthemum Society. — *La Petite Revue Agricole et Horticole*, 17e année, N. 391, p. 71. Antibes, 26 Mars, 1911. **729** **France**

The sixteenth Congress of the Chrysanthemum Society will be held, together with a chrysanthemum show, at Biarritz in 1911, from the 26th to the 29th of October, under the auspices of the Bay of Biscay Acclimatisation Society and the Horticultural Society of Bayonne. The following questions will be discussed:

1) Study of a pocket colour-scale, " *carnet portatif complément du repértoire des couleurs.* "
2) Of the best time for selecting flower-buds.
3) Parasites and diseases of chrysanthemums.
4) Study of manures for chrysanthemum culture.
5) Influence of magnesium salts on chrysanthemums.

Colorado Dry Farming Congress. — *The Dry Farming Congress Bulletin*. Vol. IV, No. 4, p. 777. Colorado Springs, Colo., February 15, 1911. **730**

The date of the Sixth Dry Farming Congress and Exhibition has been fixed by the Colorado Board of Control, acting jointly with the executive committee-men and general international officers of the congress for the week beginning on October 16th. **United States: Colorado**

This week has been selected as sufficiently late in the season to allow a large attendance of farmers from all sections of the world and yet sufficiently early to insure the enjoyment of a large number of trips through the mountain and plain districts of Colorado.

The executive board is planning a new type of programme, there being more opportunity given for technical discussion and institute work during the week.

With the permission of the Board of Governors, the local Board of Control has authorized the organization of a woman's auxiliary movement, and special attention will be given to matters pertaining to home-making, home-building and other discussions which may be of much value to women. This session for women will be held in a separate convention hall and will in no way interfere with the Dry Farming Congress proper.

731 **Copenhagen International Motor Exhibition, Scandinavian Fishery Exhibition, and IVth Fishery Congress in 1912.** - *Preliminary Programme*, p. 12. Copenhagen. (Transmitted by the Delegate for Denmark at the Intern. Inst, of Agriculture).

Denmark

In July and August 1912, there will be a Scandinavian Fisheries Exhibition, the Fourth Congress of Scandinavian Fishermen, and an International Exhibition of Motors. This last will include: motors and other machinery for fishing — boats, motor accessories, combustibles and grease for motors, models, etc.

The right to exhibit is open to all makers of naval motors, of motor-trawls, motor transports for fish, etc.

As Danish manufacturers and Danish fishermen were the first to adapt the motor to fishery, it is natural that these exhibitions should be held in Denmark, and they will no doubt be fruitful of good results for fishery in many seas.

732 D. H. OTIS. **The Farmer as a Business Manager** (Address to Illinois Farmers' Convention at Urbana, January 24, 1911). — *The Farmers' Voice*. Chicago, March 1, 1911.

United States

In connection with the work in farm management at the University of Wisconsin, an analytical study of a number of Wisconsin farms has been undertaken to ascertain, from the actual conditions existing on the farm, how much capital is invested in various phases of farm business and also the receipts and expenditures for one year. The work thus far performed has been with two sets of dairy farmers. The tables that follow give some of the results that have been found.

Series A

TOTAL RESULTS ON TEN FARMS AS THEY COME.

No	Acres	Capital	Receipts	Expenses	Profits
1	160	$ 13 046	$ 1187	$ 1116	$ 71
2	240	27 901	3207	2552	655
9	160	19 014	2897	2707	190
10	140	11 768	1905	1345	560
12	160	19 019	3370	1669	1701
13	300	27 658	4712	4504	208
14	320	37 793	5922	4027	1895
16	120	14 595	2304	1856	448
20	160	18 002	3053	3391	338
21	80	11 841	1251	1312	58

Series B.

TOTAL RESULTS ON TEN "BEST" FARMS.

No	Acres	Capital	Receipts	Expenses	Profits
1004	115	$ 21 565	$ 5787	$ 4650	$ 1137
1006	241	51 515	8360	7293	1067
1007	160	32 715	7690	5436	2254
1008	89	25 755	6394	3571	2804
1011	253	54 365	13129	8270	4859
1012	163	30 088	7595	5075	2520
1015	143	25 992	11047	5165	5882
1017	160	27 994	10045	6473	3575
1018	158	24 767	7745	4856	2889
1020	87 ½	21 565	4377	3012	1365

Average profits in the two series respectively of $ 533 and $ 2835.

The acreage of these farms does not differ greatly; in fact the farms in the first set average nearly 16 acres more than those in the second set which had gained the reputation of being quite successful. The first ten farms show low returns for the capital invested, averaging only $ 533, while the second group show five and a half times the profits, $ 2835, although much greater capital is invested.

Prof. Otis has studied intently the economical facts which have originated such marked differences in the final results of the farm management and gives detailed analytical data showing the amount and the distribution of the capital on the different farms.

The capital invested in land varies considerably with the amount and character of the land. It is slightly higher in the Series B, (the ten best farms) although the difference is not so very great, but the percentage is considerably smaller than in Series A. Under improvements are included buildings, fences, and water systems. The largest net profits are not necessarily associated with the largest investment in improvements, although the farm N°. 1011 showing next to the largest net profits, is the farm that has $ 13480 invested in improvements. The farm that gives the largest net profits No 1015. has only $ 5700 invested in improvements. The farm No. 1008 containing only 89 acres has an investment of only $ 4925 in improvements and yet has a net income of $ 2804.

Under the head "equipment" are included: dairy supplies and utensils, farm machinery, tools, wagons, carriages etc. harness and office equipment. Here again it is impossible to associate the largest equipment with the largest net profits. The investment in live stock varies from $ 1065 with farm No. 10 to $ 4580 with farm 13. Here also there is no strict relation between the amount of stock and the net profit, but it appears that the large investments in cattle are associated with the large net profits. The farms with the largest income, which are also the farms that usually have purebred live stock, require a larger cash reserve. This is a factor of considerable importance. Not infrequently an opportunity presents itself to make purchases of live stock, feeds and other things needed by the farm at a bargain, provided a man has, or can obtain, the necessary cash to complete the deal. The total capitalization varies in series A from $ 11 768 to $ 37 793 and in series B from $ 21 565 to $ 54 365. We find here the same variation that we have found in land improvements, in equipment and in live stock. But it is interesting to see that as the farms improve and as the capital increases, the farms are not only able to pay for the increased investment in the form of interest, but they are also able to return handsome profits.

Twenty to thirty years ago the farmer made his money by saving and many farmers developed this saving instinct to a remarkably high degree. The problem confronting the farmer now is not altogether how to save but also how to spend efficiently and in such a manner as to bring a fair interest on the capital.

Prof. Bailey of Cornell University says there is no doubt that the average farm is under-equipped and under-supplied with movable capital. As a result the farmer is unable to make the most of his land investment and of commercial opportunities. As labour increases in value the greater will be the need of economical organization and equipment to utilize it to best advantage.

The proportion of working capital to original investment is likely to be greatly increased in the future.

Analytical data are given for each farm regarding the expenses and receipts.

The total expenses do not vary exactly with the net profit, but in most cases where there is a large expense there is likewise a large net profit. There are some notable exceptions to this, however, particularly with farms No. 1008 and No. 13.

While there is no question but that money wisely spent for productive property will under good management bring excellent returns, it is also true that the farmer must carefully consider the various items for which he is spending his money and satisfy his own mind that the conditions, as they exist on his farm, will justify the expenditures. Many a man with ample capital has jumped into farming; and in order to get things started quickly has not hesitated to spend large sums of money, with the result that the farm is either overcapitalized, or not capitalized in the right direction, and it is impossible for the owner and probably for any one else to make the farm a paying venture.

As expected, there is a great variation in the total receipts in both the series of dairy farms.

In figuring the net profit the farm has been charged with all the labour put on it except that of the farmer himself. It includes the work performed by other members of the family and also includes the board of the labourers.

The net profits can very properly be called the labour income which goes to pay for the farmer's time and for his ability as a manager, 5 % interest on the total capital having been deducted. The average net profit of the first 10 farms is of $ 533 on an average capital of $ 20 070; of the second ten farms, of $ 2 835 on an average total capital of $ 31 632.

These facts prove that there are many factors that enter into the problem of why the farm pays or why it does not pay, it being difficult if not impossible for any one to point out all the causes that may contribute to the result. One of the most prominent factors is the man himself or what we sometimes call the "personal equation." This is something that is difficult to measure and still harder to express. The personal equation is however indicated by the general appearance of the farm, the character of the live stock, and in the financial results that are obtained in handling the farm as a business proposition.

Agriculture. — Agricultural Physics, Chemistry, and Botany.

783 MAZÉ. **Excretion of Mineral and Organic Substances from Roots and from Stomata.** — (Sur l'excrétion de substances minérales et organiques par les racines et les stomates aquifères). *C. R. de l'Acad. des Sciences*, T. 152, N. 8, pp. 452-456. Paris, 20 février, 1911.

In the ash of plants the constituents are in proportions different from those existing in the nutritive solution that was absorbed by the roots. Is this due, as Liebig suspected, to root-excretions, by which the roots expel those constituents that are not needful to the plant?

France M. Mazé has cultivated maize plants in sterilised mineral solutions, shewing that the residual liquids have an alkaline or an acid reaction according as they originally contained, when absorbed by the roots, sodium nitrate and ammonium sulphate, or magnesium sulphate or ammonium nitrate.

In the case of a sterilised solution, with calcium carbonate and sodium nitrate, which acquired an alkaline reaction, this final alkaline reaction is due to the assimilation of nitric acid, for the maize plant increased in weight while it was proved that the solution did not become alkaline after heating under pressure.

Roots also excrete organic compounds, especially sugars and malic acid. In the residual solution in which a maize plant (of dry weight gr. 14.798) has vegetated for some time, 57 mgr. of reducing sugar were found.

All solutions that become alkaline through root-action contain malic acid, which neutralises the residual soda derived from the sodium nitrate. These solutions containing sodium malate become alkaline when the malic acid, having neutralised the soda separated from the sodium nitrate, is oxidised by the roots, the sap of which remains acid.

A cause of variation in the quantity of ash constituents contained in plants is the elimination of mineral substances by secretions from the leaves. The moisture gathered in the evening or in the morning from leaf surfaces contains chlorides, calcium and magnesium sulphates, nitrates, ammonia, and organic compounds

The elimination of mineral substances through the roots and by the leaves is a cause of continual variation in plant ash.

H. Coupin. **Comparative Toxic Action of Vegetable Essences.** — *C. R. de l'Acad. des Sciences*, N. 9, pp. 529-532. Paris, 27 février, 1911. **734**

France

This is a continuation of M. Coupin's researches on the influence of different volatile substances upon plants (1).

Experimenting with wheat seedlings 1 cm. high, placed under a glass bell in an atmosphere almost saturated with an essence, but admitting the access of sufficient air for respiration and for the chlorophyll function, M. Coupin obtained the following results:

Essences may be divided into three classes according to their toxic qualities.

1) Those which kill wheat seedlings immediately: Niaouli, Badiane, Russian Anise, French Anise;

2) Those which kill wheat seedlings after a short period of vegetation: Thyme, Lemon Thyme (*serpollet*), Sassafras, Lavender, Absinthe, Aspic, Bergamot, Bigarade, Neroli, Juniper, Meadow-Sweet, Mace, Tansy, Rosemary;

3) Those which retard the growth of the seedlings, slightly injuring them: Citron (*cedrat*), Verveine, Ceylon Cinnamon, Cajeput,

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(1) See this *Bulletin*, Jan. 1911, N. 39. (*Ed.*).

Sweet Fennel, Chinese Cinnamon, Ylang-Ylang, Violet, Mandarine, Coriander, Hyssop, Sage, Camomile, Eucalyptus, Rose of Turkey, Wintergreen, Melissa, Paris Peppermint, American Peppermint, French Geranium, Angelica, Carvi, Bitter Orange;

4) Essences which only retard the growth of the seedlings: Citronelle, Bitter Fennel, Cummin, Calabria Orange, Oregon, Sandal (*Santal citrin*) Iris;

5) Essences without action · Clove, Vetiver, Patcho uly.

The greater number of these essential oils are evidently harmful to plants, but in very variable degrees.

735 G. FABRE. **Effects of the Stimulation of Air by Radium Emanations on Spore-Germination and on Vegetable Development.** - (Effets de l'activation de l'atmosphère par l'emanation du radium sur la germination et la poussée de divers organismes végétaux). — *C. R. Hebd. de la Société de Biologie*, T. LXX, pp. 187-188. Paris, 17 février, 1911.

France

Experiments show that emanations of radium favour the germination of the spores and the growth of *Sterigmatocystis nigra, Mucor Mucedo* and (in the case of seeds and seedlings) of *Linum catharticum,* when supplied within certain limits in the atmosphere of a covered vase. In the case of the flax-seedlings both germination and growth are stimulated up to a maximum of 1.5 *micro-curies*, in 2 litres of air. Germination is checked by the action of 40 *micro-curies*, which rapidly proves fatal to the young seedlings. Irradiation due to the γ rays, or the activation of the sub-stratum by radio-active substances, induces effects widely different from those obtained by definite emanations acting in a closed vessel.

736 F. W. FOREMAN. **Hydrolysis of the Protein of Linseed.** — *Journal of Agricultural Science*, Vol. III, Part 4, pp. 358-382. Cambridge, December 1910,

Great Britain

According to modern views, the protein eaten by an animal is split normally by the digestive ferments into amino-acids and other crystalline nitrogenous substances. It is in the form of such comparatively simple substances that the animal absorbs nitrogen from the alimentary canal, and builds up its own characteristic proteins.

Since it has been shown possible to separate the amino-acids formed from proteins by hydrolysis, the knowledge of the structure of proteins has greatly advanced.

Many proteins have already been hydrolysed, amongst them a certain number of those entering into the composition of animals; and it appears that for the synthesis by the animal of its characteristic proteins, the amino-acids and other crystalline nitrogenous substances prepared by digestion of ingested protein are required in definite proportions.

The proportions in which these substances are yielded by hydrolysis of the proteins of many common foods have been determined and found to be very variable. Thus, glutaminic acid results from the splitting of such animal proteins as casein, egg-albumin, serum-albumin and globulin and milk-albumin, to the amount of from 8 to 10 per cent. The proteins of cereals, on the other hand, give from 30 to 40 per cent of this substance, whilst the proteins of leguminous seeds yield only about half that amount.

Again, animal proteins appear to yield tryptophane on hydrolysis, whilst this substance is absent from the splitting products of some vegetable proteins, notably the zein of maize. Tryptophane is of especial interest, for Willcock and Hopkins have shown that tryptophane introduced into the diet of mice receiving zein as their only protein food, markedly increased their survival period.

It is also a well-known fact that gelatin cannot entirely replace protein in the diet of an animal. This is due to the absence in its composition of certain necessary groups, as tyrosine.

It appears, therefore, reasonable to assume that a food whose protein constituents are deficient in one or more of the groups necessary for animal nutrition will give the most economical results when combined in a diet with foods whose protein constituents yield on digestion abundance of these splitting products. From this it follows that a knowledge of the products of hydrolysis of the proteins of the common foods used on the farm may be expected ultimately to provide data which will form a scientific basis for the compounding of food rations. The examination of the proteins of linseed have led the writer to these results on hydrolysis:

Glycine	0.016 grm.	
Alanine	2.99 ,,	1.03 %
Valine	37.0 ,,	12.71 ,,
Leucine and Isoleucine	11.57 ,,	3.97 ,,
Proline	8.29 ,,	2.85 ,,
Phenyl Alanine	12.06 ,,	4.14 ,,

Aspartic acid	1.79	„	1.65 „
Glutaminic acid	33.71	„	11.58 „
Serine			present
Tyrosine			0.05 %
Arginine			6.06 „
Histidine			1.66 „
Lysine			1.19 „
Ammonia			1.91 „
Tryptophane			present

The outstanding feature of the hydrolysis is the very high content of valine, 12.7 %. Most proteins yield on hydrolysis under 1 % of valine, and with the exception of certain keratins the writer can find no record of a protein yielding more than 2 %. The percentage of tyrosine in the protein of linseed appears to be exceptionally low.

The analytical methods are given in full detail.

737

United States: Massachusetts

FRED. W. MORSE. **The Soluble Carbohydrates in Asparagus Roots.** — *The Journal of the American Chemical Society.* Easton, Pa. Vol. XXXIII, N. 2, February, 1911, pp. 211-215.

This paper is a part of the investigation of the fertilizer requirements of asparagus, conducted at the Massachusetts Agricultural Experimental Station.

The roots analysed were secured in November of the second year after setting, when translocation from the tops was believed to be complete.

The average composition of the dry matter of the roots was as follows: (average of 16 roots):

Protein (nitrogen × 6.25)	11.03 %
Fat	1.00 „
Fibre	15.39 „
Nitrogen - free extract	63.34 „
Ash	6.24 „
Sugar, calculated as invert sugar	41.43 „
Pentosans	8.78 „
Galactans	1.04 „

An examination of 25 roots showed 12 to contain no reducing sugars, while most of the others had only traces present; therefore reducing sugars are reckoned with total sugars. The latter were especially abundant and ranged from 26.4 per cent to 50.8. Pentosans were determined in 16 samples and ranged foom 7.32 to 10 68 per cent. Among the sugars, fructose predominates over glucose, and the non-reducing property before hydrolysis indicates some condensation product formed between them.

These results are, on the whole, in close agreement with those recently obtained by Wichers and Tollens. There was, however a marked difference in the behaviour of the water-extract of the roots, which contain a sugar-like carbohydrate. Wichers and Tollens used boiling water, and state that only a portion of this carbohydrate was soluble in water when extractions were made on the water bath. Their solutions also reduced Fehling's solution before hydrolysis.

The writer's extractions were all made with water at 20° C. and, until hydrolyzed, either had no reducing action, or precipitated only traces of copper.

This difference in solubility and reducing action is doubtless due to the stage of development of the roots, since Wichers and Tollens worked upon roots gathered in April and July, instead of in November.

L. BERNARDINI. **Phosphorus, Magnesium and other Constituents of the Embryo of Rice.** — (Sulla composizione chimica dell'embrione di riso). *Rendiconti della Società Chimica Italiana*, Sez. Napoli, Vol. III, Fasc. III, pp. 38-40. Roma, 18 Marzo 1911. **738**

The writer has made a quantitative determination of the forms of combined phosphorus together with the mineral elements constituting the embryo of rice, arriving at the following conclusions:

1) The greatest concentration of phosphorus in a grain of rice is found in the embryo · in the entire grain $P^2 O^5 = 0.95\,\%$; in the embryo $P^2 O^5 = 6.20\,\%$.

2) 83 % of the phosphorus in the embryo is in the form of Phytin. **Italy**

3), 4), and 5). The ash of the embryo contains the mineral elements indispensable to higher vegetable life, relatively large quantities of silica and especially of potassium and magnesium. The high proportion of magnesium in the ash of the rice embryo, according to the writer, is a new proof of the importance of this element in vegetable economy, and taken together with its high phosphorus content would go to confirm the opinion, already expressed by the writer, that the assimilation of phosphoric acid depends on the relative proportions of lime and magnesium. Magnesium probably acts by setting free the phosphoric acid during the germination of the grain.

739 FRED. W. HEYL and CHAS. RAIFORD. **The Death Camas,** *Zygadenus intermedius*, **a poisonons Weed** (1) — *The Journal of the American Chemical Society*, Easton, Pa. Vol. XXXII, N. 2, pp. 206-211. February, 1911.

The poisonous character of the several species of plants designated as «Death Camas» has long been known to the stockmen of certain Western States of the U. S. These plants belong to the genus *Zygadenus*, and are found in Montana, Wyoming, Colorado, and other States of the North-West, where they have from time to time caused heavy stock losses, particularly among sheep.

United States: Wyoming

In Wyoming the most common species is the *Z. intermedius* and the greatest stock losses noted have usually occurred in the early spring, when this plant is in bloom, and before ordinary forage plants are plentiful.

The present paper reports the results of the approximate analyses of the different parts of this species. The results (in percentages) are stated in the following table:

	Leaf	**Flower**	**Bulb**	**Root**
Moisture	6.91	6.13	7.50	7.50
Starch (by diastase) . .	absent	absent	23.53	absent
Pentosans	10.81	7.95	4.41	12.04
Crude fibre	16.17	10.58	5.08	21.53
Protein	13.25	19.73	6.19	6.78
Ash	8.12	8.91	4.29	18.11
Resin	5.03	undet.	2.58	5.00
Sucrose	5.60	undet.	18.44	1.02
Reducing sugar (calculated as invert sugar) . .	5.89	undet.	6.69	2.45
Dextrin	3.26	trace	1.40	0.34

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(1) The genus *Zygadenus* belongs to the Liliaceae; it contains 12 species, one of which is Siberian and the remainder North American and Mexican. Some of the species have poisonous bulbs, rhizomes and foliage. The genus is monographed by Watson, Proc. Amer. Acad. Arts and Science. 14.278 (1879).
See: BAILEY, *Cyclopedia of American Horticulture*, vol. IV, pag. 2014. [*Ed.*]

The poisonous character of the plant is due to the presence of alkaloids. In *Zygadenus venenosus* were found sabadine, sabadinine, and veratralbine.

The alkaloid content of *Z. intermedius* is 0.26 per cent in the leaves and 0.24 per cent in the bulb. The flowers gave 1.5 per cent of average crude alkaloid residues; the roots 0.5 per cent.

J. KONOWALOW. **Lime as Plant Food and Relative Proportions of Lime and Magnesia in Nutritive Solutions.** (Ueber den Kalkbedarf der Pflanzen und über die verschiedenen Verhältnisse von Ca O zu Mg O in der Nährlösung). — *Die landwirtschaftlichen Versuchs-Stationen,* B. LXXIV, III-V, pp. 343-360. Berlin, 1911. **740**

Russia

The first set of experiments with cultures in sand and in water was made with oats, millet, wheat, *Setaria italica, Lupinus albus,* and maize («cinquantino»).

If *a* denote the quantity of calcium oxide in the first nutritive solution, then the series $4a$, $2a$, a, $^{1}/_{2a}$, $^{1}/_{4a}$ $^{1}/_{8a}$, $^{1}/_{16a}$, $^{1}/_{32a}$ and 0, represents the proportion of calcium oxide in the other cultures.

The first nutritive solutions were made up of different salts, but the content of nutritive substances was alike in all the experiments. In the sand cultures quartz sand was treated with concentrated hydrochloric acid and then with distilled water, so as to entirely remove all acid; and to every kilogram a nutritive mixture was given containing in its salts the following elements per kg. of sand or $^{1}/_{2}$ litre of water:

Nitrogen	0.100 gr.
Phosphorus	0.035 »
Potassium	0.083 »
Sulphur	0.024 »
Calcium	0.144 »
Magnesium	0.018 »
Iron	0.008 »
Chlorine	0.036 »

The second set of experiments was with barley in soil and millet in sand, nutritive solutions being used in which the proportion «calcium: magnesium» varied from $\frac{9.7}{1}$ (calcium 0.144 gr., magnesium 0.015 gr.) to $\frac{1}{1}$, $\frac{2}{1}$, $\frac{1}{1}$, $\frac{0.7}{0}$, and $\frac{0}{0}$.

The calcium was given under the form of nitrate, and the magnesium under the form of sulphate. The calcium was also given in the form of sulphate and of carbonate in the proportion of $\frac{0.7}{1}$

As for the millet, the calcium was given in the form of phosphate, in the same proportion, and in the form of carbonate in the proportions: $\frac{13.4}{1}$, $\frac{26.8}{1}$, and $\frac{53.6}{1}$.

The conclusion was that the plants experimented on greatly need lime, and it was found that 0.144 gr. calcium, or 0.20 , in the nutritive solution gave the best results.

With regard to the proportion «calcium . magnesium» this remained nearly constant in the quantities assimilated; and the effect of the different proportions 1 : 1 for calcium nitrate, 0.7 : 1 for calcium sulphate and up to 53.6 : 1 for calcium carbonate depended on secondary actions in the soil. The most favourable results were obtained with tricalcic phosphate in presence of ammonium nitrate. It appears that the calcium serves to neutralize the excess of magnesium, the action of which is only good when it occurs in limited quantities. Therefore the good effect of calcium depends, not on the ratio it may bear to magnesium, but on its absolute amount.

741 P. Passy. **Variation of Form in Fruit.** (La variation de la forme dans les fruits). — *Bull. des Séances de la Société Nationale d'Agric. de France*, N. 1, pp. 48-49. Paris, janvier, 1911.

France

In opposition to the theory, put forward some years ago, that stocks have a morphological and hybridising influence on grafts, even forming asexual hybrids, Mr. Passy publishes the following observations:

« The influence of the stock is certain in all that concerns the vigour, fertility and long life of the graft, and the beauty, colour, and even flavour of the fruit of the graft.

« There is no influence whatever on the real modification of the true characters of the graft or its fruit; and there is no formation of hybrids between stock and graft.

« The modifications of form, noticed on various grafts after grafting, are accidental and of the same nature as those to which attention has already been drawn.

« Both soil and climate modify the fertility of our trees, their length of life and the beauty of their produce, but not the fundamental characters of our varieties. The influence of the stock is of the same kind, and is a matter of nutrition ».

E. BORDAGE. **Acquired Characters and Heredity.** — (A propos de l'hérédité des caractères acquis. *Bull. Scient. France et Belgique,* XLIV, pp. 51-88, pl. II-III, 1910). *Botanisches Centralblatt,* Bd. 116, N. 7, p. 165. Jena, 14 Februar, 1911. **742**

Ceylon

It has been affirmed, by Detmer, that the leaves of the cherry (*Prunus Cerasus L.*) imported into Ceylon have become persistant. M. Bordage considers that the periodical change of foliage is determined by the alternation of the seasons and gradually becomes hereditary and independent of further external action. After discussing the opinions of Weissmann, Constantin and G. Delage, the writer points out that the cherry is not a well-chosen example, because it is sterile in Ceylon. On the other hand, the peach is propagated in Ceylon by grafting and by slips, not from seed, and the leaves in Ceylon are sub-persistant, this new character appearing to be hereditary, according to the recent personal observations of M. Bordage. This would confirm the opinion of Detmer.

The writer further draws attention to the antagonism which exists between growth and reproduction in plants, and endeavours to explain the period of leaf production, and occasionally of flowering, in certain plants growing in the tropics, at a time when atmospherical conditions are absolutely unfavourable to vegetation.

ÉD. GRIFFON. **Variations in Grafted and Ungrafted Solanaceae and Compositae.** — Variations avec ou sans greffage chez les Solanées et les Composées) *Bulletin de la Société Botanique de France*, T. LVII, (4^e série, t. X), N. 7, pp. 516-525, pl. XXV-XXVI. Paris, nov. 1910. **743**

France

In studying, during the last five years, the effects of grafting, the writer has had occasion to observe rapid modifications in plants.

These modifications appeared in grafted and ungrafted plants of the families of the Compositae (*Helianthus tuberosus*) and of the Solanaceae (*Solanum esculentum*, *S. ovigerum*, *S. Maglia*, and *S. Commersonii*).

The observations and experiments of Mr. Griffon show that the greater number of the morphological changes which he has obtained in grafted plants are to be found in the same degree and perhaps more frequently in ungrafted plants.

These modifications are not generally hereditary by seed or slips; cases may, however, occur from time to time of evident abrupt variation, transmissible by asexual reproduction, but there is nothing to prove that such variations were originally induced by grafting.

744 H. F. ROBERTS. **Breeding for Type of Kernel in Wheat, and its Relation to the Grading and Milling of the Grain.** — *Kansas Sta. Bul*, 170, pp. 99-138, and *E. S. R.*, Vol. XXIV, N. 2, Washington, February, 1911.

United States: Kansas

Mr. Roberts presents in tabular and graphic form the results of studies of the packing quality and volume weight of 52 races of wheat. Special attention was given to the ratio of length to width. In 27 races this ratio varied from 1.88 to 2.14, and in the remaining 25 races from 2.15 to 2.84. The data presented lead the writer to conclude that a « difference of at least 3 lbs. to the bushel in the test weight can be gained by breeding for short-kerneled races of wheat. When other factors than ratio are considered, it has been found that as much as 7 lbs per bushel may be gained by breeding for specific types of kernel ». The superior samples were invariably those having the lower ratio of length to width. When the ratio of length to width remains constant, a higher kernel volume is generally accompanied by higher bushel weight, « except in the higher ratios where the reverse is the case ».

The writer concludes that the grower should produce a wheat that will test high in bushel weight and that the just and scientific grading system will give preference to wheat having a high percentage of grain in the packed measure. He suggests a system whereby wheat with a narrow, shallow crease will receive the advantage justified by its lower bran percentage.

To measure the degree of packing in a sample of wheat a 1000 cub. cm. graduated glass cylinder may be packed with grain and the volume of air contained measured by pouring in alcohol.

H. Kaserer. **Mineral Nutrition of Azotobacter.** (Zur Kenntniss des Mineralstoffbedarfes von Azotobakter, zugleich ein Beitrag zur Kenntniss der Silicate). — *Zeitschrift für das Landwirtschaftliche Versuchswesen in Oesterreich*, XIV J., H. 2, pp. 97-123. Wien, Februar, 1911. **745**

Austria

Experiments were made, at the Institute for Plant Production at the High School of Agriculture in Vienna, with pure cultures of *Azotobacter chroococcum*, Lipman, *Az. Beijerinckii*, Lipman, *Az. Vinelandii*, Lipman, and the *Azotobacter Beij.* of Christensen.

1) *Azotobacter* and other soil bacteria multiply only in solutions which contain iron and aluminium in a soluble form; when the bacteria assimilate the nitrogen of the air, they have still greater need of these elements.

2) Among inorganic compounds, silico-phosphates have proved best adapted for supplying the amount of iron and aluminium needed by the bacteria.

3) Manganese has also a favourable action on *Azotobacter*, but the necessity of its being in the form of silicate is not yet proved.

4) *Azotobacter* can assimilate nitrogen even in pure cultures, if carbon is supplied as dextrose, and when the mineral nutrition is secured.

5) The favourable action of humus, of soil extracts and of organic salts is explained by the fact that they contain compounds of iron and aluminium and prevent their precipitation.

6) Different varieties of *Azotobacter* require different proportions of iron and aluminium. This power of adaptation, and the variable content of assimilable salts in the glass and the solutions used in the experiments, sufficiently account for divergences in different experiments.

A bibliography illustrates this paper.

746 C. Cappello. **Weather Forecasts and the Guilbert Method. The Telemeteorograph** (La previsione del tempo e il metodo Guilbert). — *Rivista Meteorico-Agraria, Minist. di Agricoltura, Industria e Commercio,* anno XXXII, N. 1 pp. 31-37. Roma, gennaio, 1911.

Italy

Mr. Guilbert has observed that the clouds which gradually appear in a region previously covered by an anti-cyclone are successively: cirri, then cirro-cumulus clouds, then *pallia,* or uniform curtains of cloud, and finally broken clouds. And here he distinguishes two cases:

1) The barometric depression corresponds with the order of the clouds, beginning with the first appearance of the cirri, reaching its lowest under the rain clouds, and rising again after the storms of rain have fallen.

2) Or there is no correspondence between the cloud-succession and the variations of pressure: in such a case the barometer rises notwithstanding the appearance of cirri and cumulo-cirri; or the barometer falls and the rain comes down immediately.

Mr. Guilbert lays down the following rules: In the case of correspondence between the cloud-succession and the variation of barometric pressure, the gradient is not established and there will be light or moderate winds, however great may be the fall of the barometer. In the other case, on the contrary, the gradient is marked, and strong winds will follow. Correspondence therefore indicates calm weather, and its absence strong winds.

This method is based on the assumption of normal winds. When the force of the wind is in proportion to the gradient in the second case, and its direction is that indicated by the law of Buys Ballot, it is said to be normal. When the force of the wind is above or below normal, or its direction is not the theoretical direction according to the distribution of existing pressures, the wind is called respectively abnormal in excess, deficient, or divergent.

Anomalies of force or direction cause variations in the importance and the position of a cyclonic or anti-cyclonic centre, and determine (on the principle of least-resistant surfaces) the probable variation in the distribution of pressures, which means that the chart of mean barometric pressure for the following day may be foreseen, and the weather predicted for the following 24 hours.

Mr. Cappello proposes the adoption of the Guilbert method in the Italian Meteorological Observatories. But in order to have the forecasts in time, the Central Meteorological Bureau of Rome should telegraph to the other observatories, not the figures, but the chart of mean barometric pressure in Europe, and especially in Italy.

For this purpose Mr. Cappello has invented an apparatus which he calls the *telemeteorograph*.

747 PELET BERENT. **Protection of Crops against the Weather** (Witterungsverhältnisse als Ursache von Pflanzenschädigungen und Vorbeugungsmassregeln gegen dieselben). — *West-preussische Landw. Mitt.* J. XVI, N. 11, p. 92. Danzig, 16 März, 1911.

Germany

The farmer disposes of many remedies for cryptogamic diseases and insect pests, but generally looks upon extremes of frost, wet and drought as matters of fate and beyond his control. There are however means of defence even against these dangers.

During hard frosts, when there is no snow to protect the young corn, it is often killed: the water in the plant tissues becomes frozen, increases in volume, and bursts the tissues. The wheat fields should be covered with straw or farm manure, to limit the radiation of heat from the soil.

During the warm hours of winter afternoons the ice thaws from the surface downwards, so that the surface-soil sinks because of the reduction of its volume and leaves the roots uncovered. During the night the water thus thawed freezes again, the surface rises, and the roots, whose extremities have penetrated deeply into the soil, are torn. Good drainage may obviate this danger.

When young wheat remains too long beneath the snow it is liable to die for want of air. Where there is this danger, the wheat must be sown thinly, so that each plant has space.

When the soil is too wet, air cannot circulate freely and the roots are apt to rot. Here too good drainage is necessary.

The disastrous effects of drought may be limited by the following methods:

1) By increasing the thickness of the cultivated stratum by abundant manuring with farm yard manure;

2) By very deep cultivation and winter fallow.

3) By enriching sandy soils with abundant organic manurings, so as to produce moisture-retaining humus.

748 F. CHAVERNAC. **Field Ventilation, a New Method of Preservation against Spring Frosts.** (Préservation des gelées printanières. Nouveau procédé). — *Progrès agricole et viticole*, N. 7, pp. 211-213. Montpellier, 12 février, 1911.

France

Spring frosts occur under three atmospheric conditions, prevailing in immediate succession

1) cold preliminary wind;
2) calm weather;
3) sunshine.

If one of these conditions fails, there is no frost. Artificial clouds are sometimes very effectual, but when the weather is very calm, the smoke rises vertically and produces no effect. It is a common observation that as long as the wind blows, there is nothing to fear. The writer would therefore aim at producing wind artificially, and proposes the installation of electric ventilators in vineyards. He considers that this idea may prove of service to vine and fruit culture.

749 E. E. FREE and J. M. WESTGATE. **Controlling Blowing Soils.** — *U. S. Dept of Agriculture, Farmers' Bull.* 421. Washington, December 22nd 1910.

Jnited States

This bulletin gives an outline of the methods for avoiding the injury caused to crops and soil by excessive wind-erosion in the arid regions of the United States.

When the mechanical removal of the soil (either by wind or other agencies) is too rapid, there is not time for the preparation of new soil by the weathering of rock fragments.

Damage by soil-blowing usually is twofold,: to the soil, by blowing away the fertile layers; and to the crop by uprooting, burying, or cutting of the young plants.

The means by which the damage may be prevented or decreased are two: 1) *Increasing the cohesion of the soil* and 2) *decreasing its exposure to the wind.*

The cohesion may be increased: (1) by increasing the water content of the soil; (2) by adding to the amount of humus which it contains by green-manuring and by the use of stable manures; (3) by modifying the soil-texture, either by the addition of clay, or leaving it in small clods, instead of in a pulverized condition.

The exposure of the soil to wind may be decreased:

1) By keeping the soil covered with vegetation:

a) by providing a cover of growing vegetation of oats or barley, sown in the late summer or early fall.

b) By combining with a slow-growing crop, subject to wind damage, a more rapid-growing nurse-crop, which will protect the former during the first stages of its development.

Thus, a thin seeding of rye or barley may be used in which lucerne is introduced.

c) If enough water is available, by replacing the summer fallow by a leguminous crop which is ploughed under in the autumn.

d) Another method is to sow rows of coarse-growing crops at intervals across the fallow field, at right angles to the prevailing winds.

2) By leaving the stubble of the last crop to stand long on the land.

3) By providing an artificial cover of straw, brush lines, etc. and by planting windbreaks to protect the fields.

The protective effect of a wind-break will extend from 10 to 20 times its height. In a few cases of intense cultivation, low close-set brush lines are useful, such as wind breaks of sage-brush in a field of Asparagus.

The Use of Wind-breaks in the West Indies. — *Agricultural News.* N. 227, p. 1-3. Barbados, Jan. 7, 1911. **750**

In the West Indies, conspicuous examples can be easily found of the great degree to which the growth of plants is retarded by exposure to constant winds. When raising varieties of a delicate nature, and possibly of exotic origin, it is necessary to protect them against the wind; hence the importance of wind-breaks.

West Indies

Wind-breaks, or shelter belts, as they are often termed, may be permanent or temporary, according to the crops that they are designed to protect. For perennial crops, such as limes or cacao, plants that will form large trees are required. Annual crops, such as cotton and most kinds of low growths do not necessarily demand large or long-lived plants for purposes of protection.

The permanent wind-break, planted at the same time as the crops it is to protect, grows generally at a quicker rate and is available for their protection by the time they have attained maturity.

Among the plants more commonly used in the West Indies in this connexion are: Pois doux (*Inga laurina*); Madura or Nicaragua shade tree (*Gliricidia maculata*) a quickly growing plant; Galba (*Calophyllum Calaba*) which withstands sea-blasts well; Savonnette (*Lonchocarpus violaceus*); White cedar (*Tecoma leucoxylon*), used more particularly in Montserrat. Bamboos have also been employed for the purpose, although their great drying action on the soil forms an objection to their extended employment. The temporary wind-breaks most commonly used are Guinea corn and pigeon peas. In cotton cultivation, one or the other of these may be planted at the head of the rows, on the windward side, if the best results are to be obtained.

751 L. I. PRASOLOV. **Valley Soils in the South-West Central Thian Shan.** (O potcvakh Dolin ing-sapadnoi Tcasti Zentralnago Tian-Sciana). *Tr. Potcv. Eksped. po Issl. Kolns. Raionov As. Rossii.* (Work of the Botanico-Geological Committee for the colonisation of the territories of Asiatic Russia). C. I., N. 5, Sph. 1909 b. — *Journal Opetnoi Agronomii.* (*Journal of Experimental Agriculture*) God XI, Kniga 6, pp. 843-845. St. Peterburg, 1910.

Russian Empire: Turkestan

Large rivers, such as the Naryn, the Kysil, etc. descend from the South-western spurs of the Thian Shan mountains towards the great plains of Turkestan, in Central Asia, forming wide valleys whose soil and climate render them adapted for colonization.

In the lower part of the territory there are steppes, either arid or subject to periods of drought; these merge on the one hand into desert, and on the other into woods and meadows. The woods are formed of deciduous trees and are never dense; conifers are few and scattered. Further south the steppes encroach upon the mountain slopes.

The soils have been examined with regard to:

1) Content of humus, water, nitrogen, and carbonic acid;
2) Mechanical structure;
3) Extracts with hydrochloric acid at 10 %;
4) Water extracts.

The principal types of soil are:

1) *Light brown clay soils*, containing 1.80 to 2.84 % of humus; 2.32 to 7.37 % of carbon-dioxide, and 18 % of zeolite.

2) *Dark clay soils,* found on the arid mountain slopes; they contain 8 to 10 % of humus and a larger proportion of zeolite than the foregoing;

3) *Soils resembling black soils,* found on the lower slopes of the mountains and nearly up to the lower limit of the fir woods. They are characterised by a surface stratum consisting chiefly of coarse humus about 10 cm. deep and very dark in colour;

4) *Mountain forest soils,* resembling the « black soils », from which they are distinguished chiefly by a greater development of peat, by less moisture and by the absence of carbonates. Their content of humus is very high, about 23 to 24 %.

F. T. SHUTT. **Some Characters of the Western Prairie Soils of Canada.** — *The Journal of Agricultural Science,* Vol. III, Part 4, pp. 335-357, Cambridge, Dec. 1910 (1). **752**

Canada

The term "prairies", as applied to the Canadian West, is used to denote all that portion of the Great Plains Region, north of the 49th parallel, found within the confines of the three western provinces, Manitoba, Saskatchewan, and Alberta, and northward to the Arctic Ocean.

There are in these three provinces about 180 000 000 acres suitable for cultivation, the greater part of which is adapted to wheat-growing.

The summers are characterized by high day temperatures, the winters by clear, very cold weather. The greater part of the rain falls during the growing season (the amounts falling between April 1st and Oct. 1st are respectively 9.39 in. and 12.87 in., or 70.3 and 74.2 per cent of the whole.

The richness of the prairie soils lies in the great accumulations of nitrogenous organic matter with its associated mineral constituents, the remains of countless generations of plant life and bacterial activity.

The presence of more or less soluble alkaline matter, especially carbonate of lime, renders the soil favourable for bacterial activity and vegetable life in general.

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(1) See n. 372 in this *Bulletin* for February 1911.

The prairie soils contain abundant stores of the mineral elements of plant food, and also of vegetable matter incorporated with sand and clay. The functions of the humus are to afford a storehouse for nitrogen, and to liberate during its decay potash, phosphoric acid and lime. The productiveness of these soils, whether clays or sandy loams, depends on the amount of nitrogen they contain.

The winter season, with its intense cold, locks up the stores of plant food from the autumn to when the season again opens. Waste from leaching, such as occurs in countries in which the winter is mild and open, is thus prevented.

The analyses of the soil from the Dominion Experimental Farm at Indian Head allow of a comparison between the virgin prairie, and the same soil after 22 years of cultivation without manure, and show the enormous losses of organic matter and nitrogen which have resulted from the present method of continually cropping with grain.

DEPLETION OF SOIL NITROGEN.

NITROGEN-CONTENT OF VIRGIN AND CULTIVATED SOILS INDIAN HEAD, SASKATCHEWAN.

	To a depth of 4 inches		To a depth of 8 inches	
	per cent	lbs. per acre	per cent	lbs. per acre
Virgin Soil	0.409	3824	0.371	6936
Cultivated Soil	0.259	2421	0.254	4750
Difference or loss due to removal in crops and to cultural methods	0.150	1403	0.117	2186

Though the cultivated soil to-day, after nearly a quarter of a century's tillage, is still very rich, and possibly might yield as fine a crop as it did at the outset, yet compared with untouched prairie it is seen to have lost practically one-third of its nitrogen. A marked falling off of phosphoric acid is also to be noted.

A. MAZZARON. **Contribution to the Study of Organic Mould.** — (Contributo allo studio sui terricci). — *Bollettino della R. Società Toscana di Orticoltura*, anno XXXVI, N. 1. Firenze, gennaio, 1911. pp. 14-23. **753**

Italy

The writer gives tables containing the results of the analysis of the moulds more commonly used for gardening in Italy, such as beech-mould, peat, black earth, and chestnut mould. The data of the chemical analysis represent the percentage of assimilable substances contained in mould (*terriccio*), properly so called, or in decomposed wood mould, (*pulesco*).

Moulds are shown to be true manures. They contain largely the elements useful to plants, in conditions which render them easy of assimilation. Their richness in organic matter gives them special physical properties, not found in the best ordinary soils. With regard to the proportion between mineral and organic matter, moulds may be divided into two classes:

a) true moulds, *i.e.* beech mould, peat mould and black mould;
b) decomposed wood moulds, *i.e.* of chestnut, oak, willow etc.

The characteristics of each class are evident, and their great practical importance is known to gardeners who will readily substitute one true mould (beech, peat etc.) for another; but they cannot find a substitute for chestnut mould in the culture of Azaleas, Camelias etc.

The weight per litre of "chesnut-earth" is 416 grams. In the natural conditions this mould contains from 56 to 66 % of moisture, its hygroscopic water being about 19 %; chesnut mould contains from 8 to 9.5 % of ash and 0.6 to 0.7 % of nitrogen. The proportion of lime is from 0.4 to 0.9 %; of phosphoric oxide about 0:05 %; and of potash 0.15 to 0.17 %.

In wood moulds there is less nitrogen and phosphoric anhydride. In the true moulds there is a higher proportion of mineral substances, the ash content being sometimes over 50 %; in wood-moulds the highest percentage of ash was found to be 15.2, in acacia mould; the prevailing ash-contents being about 10 %.

There is not much difference in the percentage of natural moisture, but the true moulds lose their moisture more readily. There is little difference in their specific weight, although true moulds have a percentage of ash four times higher than that of the wood moulds.

Wood moulds are formed almost entirely of decomposed wood, and contain very little ash; they are thus more hygroscopic and have a greater specific heat. While true moulds consist of leaves and roots, the wood moulds are more homogeneous and have a slightly higher specific weight.

754 G. I. Joukow, **Carbon-dioxide in Ground Air.** (Uglekisli Gas potcvennago Vosdukha). — *Khosiaistvo* (*The Home*), God VI, N. 2, p. 37-46. Kiev, 13 Janvar, 1911.

Russian Empire

In 1907 and 1908 numerous experiments were carried out at the Agricultural Experiment Station at Sumsk, to determine the factors influencing the content of carbon-dioxide in ground air.

The following conclusions were reached: (1)

1) Fallows treated with dry-farming methods of frequent cultivation, in order to maintain moisture and a high temperature in the soil, contain more carbon-dioxide than those less cultivated.

2) In April fallows the content of carbon-dioxide increases during summer and reaches a maximum in August.

3) This content varies according to depth between a maximum at 30 cm. and a minimum at 10 cm.

4) Farm-yard manure increases the content of carbon-dioxide in the soil.

5) The following table shows that carbon-dioxide accumulates in greater quantity in the air of soils where lucerne, beet, clover and potatoes are grown than in uncultivated soils:

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(1) These results coincide with those obtained many years ago by Pettenkofer and Fleck, in studying the monthly variations of carbon-dioxide in ground air in 1872 and 1873. The influence of moisture on the variations of carbon-dioxide in ground air, and therefore on the activity of soil bacteria, was first pointed out by Ewald Wollny. (*Ed.*).

Depth in cm.	Lucerne		Clover		Potatoes		Beet		April fallow	
	CO_2	Moisture	CO_2	Moisture	CO_2	Moisture	CO_2	Moisture	CO_2	Moisture
10. . . .	8.36	12.58	4.18	10.38	4.84	13.51	3.96	13.42	3.08	18.46
20. . . .	10.78	12.26	7.26	11.01	6.60	16.27	6.16	12.75	3.35	20.90
30. . . .	12.10	15.78	7.26	11.40	5.50	16.07	7.04	11.61	5.28	24.52

6) Sandy soils are much less rich in carbon-dioxide than those containing organic matter, especially peaty soils, as the following table shows (1):

Depth in cm	Peat soil from a dried bog				Bare sandy soil		Wooded Soil
	Fallow		Cultivated				
	CO_2	Moisture	CO_2	Moisture	CO_2	Moisture	CO_2
10	33.64	Damp	8.36	Damp	1.10	1.33	8.36
20	42.68		11.10		1.32	1.56	3.30
20	56.54	Soil	49.06	Soil	1.32	1.48	3.96

A. SUPRUNENKO. **On Carbon-Dioxide in Ground Air.** (Materiali K Voprosu ob uglekislotié potcvennago Vosdukha). — *Sapiski Novo-Aleksandriiskago Instituta Selskago Khosiaistva i Liesovodstva* (Records of the Agricultural and Forest Institute at Nowo Alexandria (Gov. Lublin), vol. XXI, Livr. première, pp. 59-63, S. Peterburg, 1910. **755**

Russia Many experiments were made, during the years 1908-1910, at the Agricultural and Forest Institute at Moscow, from which the following conclusions may be drawn:

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(1) It is not said in the original paper if these proportions of carbon dioxide in ground-air are percentages or per 10-thousandths. (*Ed.*).

1) The quantity of carbon-dioxide contained in the air of the soil is never enough to injure vegetation; it varies according to the nature of the soil, as is shown by the following table (1):

QUANTITY OF CARBON-DIOXIDE CONTAINED IN THE AIR OF DIFFERENT SOILS LEFT FALLOW IN 1909.

	Clay Soils	Wet Soils	Pure clays	Sandy soils
Average	15.7	14.7	11.0	8.7
Maxima	20.5	19.5	17.1	21.6
Minima	7.9	7.2	5.5	5.0

2) The content of carbon-dioxide in proportion to the depth can only be ascertained on fallow soils, the position and development of roots in cultivated soils causing irregularities, as is seen in the following table:

AVERAGE QUANTITY OF CARBON-DIOXIDE IN THE AIR OF THE SOIL AT DIFFERENT DEPTHS, IN CULTIVATED AND UNCULTIVATED LAND.

Depth of stratum	25 cm.	50 cm.	75 cm.	1.25 m.
Fallow soil	mg. 9.2	12.4	13.1	18.1
Soil sown with winter rye	» 13.0	16.2	14.2	13.9

3) *Effect of rain on the carbon-dioxide in ground air.* — Light rains after a long period of drought increase the carbon-dioxide in soils, which shows that they awaken the activity of plants and microorganisms.

Abundant rains produce a contrary effect, as was clearly shown in the wet spring of 1909, in fields sown with wheat in March.

Determinations made at short intervals in August, 1908, after prolonged rains, were even more instructive: from the 14th to the 17th a diminution of from 5.3 to 6.1 of carbon-dioxide was observed, varying according to soil.

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(1) The method followed is by fixation of carbon-dioxide on baryta. The data are referred to one litre of air at 0° C. and 760 mm. pressure.

O. SCHREINER and E. C. SHOREY. **Glycerides of Fatty Acids in Soils.** — *The Journal of the American Chemical Society*, V. XXXIII, N. 1, pp. 78-80. Easton, Pa., January 1911. 756

United States

The writers have previously isolated paraffinic acid and in the present paper they deal with the examination of the alcoholic filtrate obtained from the lead salt of this acid. This yielded on evaporation an orange-coloured oil which partially crystallised on cooling. On saponification the oil was split up into glycerol and a complex mixture of fatty acids; a small quantity of unsaponifiable matter was also found. It is consequently a mixture of glycerides of fatty acids. The writers are of opinion that these glycerides are not formed by purely chemical reactions, taking place in the soil but are unchanged plant residues.

E. C. SHOREY and E. C. LATHROP. **Methoxyl in Soil Organic Matter.** — *The Journal of the American Chemical Society*, V. XXXIII, N. 1, pp. 75-78. Easton, Pa., January 1911. 757

United States

It is well known that the quantity of organic matter in soils, which is produced by plant decay, is very variable. The writers have continued the chemical examination of the organic matter, endeavouring thereby to trace the chemical changes which go on during decay.

Determinations of the methoxyl group (1) were made on ten soils of varied origin, containing percentages of total carbon ranging from 0.3 to 27.1. Two of the samples were found to contain no methoxyl, while the quantities present in the others attained a maximum of 1.114 per cent in the soil with the highest carbon content, a peat from N. Carolina. However, it was found that the quantity of methoxyl bears no constant relation to the total carbon. Taking into consideration the fact that methoxyl groups are being added to the soil from three different sources, namely from alkaloids, essential oils, and woody fibre, and moreover are to be found in some soils and not in others, the writers conclude that there are fundamental differences, chemical, physical or biological, which decide the manner in which complex organic bodies break down during decay.

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(1) Methoxyl group, a group of atoms, $O.CH_3$, which forms a constituent part of some organic bodies. Methoxyl compounds have been extracted from the roots of some plants. [*Ed*]

758 O. SCHREINER and E. C. SHOREY. **Phytosterol and other Cholesterol Bodies in Soils.** — *The Journal of Biological Chemistry*, vol. IX, N. 1, pp. 9-11. Baltimore, Md., March 1911.

United States

In a previous paper the isolation of a cholesterol body, agrosterol, from soils was described. In the present paper the isolation of another cholesterol body from soil is presented. This has been identified as phytosterol, the most common cholesterol body of plants.

The variability of the organic matter of soils has been pointed out and emphasised by the writers in previous papers, but the occurrence of these two cholesterol bodies, agrosterol and phytosterol, in soils shows that this variability extends to cholesterols. Phytosterol occurs in the soil in combination, probably as an unchanged plant residue, while agrosterol occurs free and may be the result of the breaking up of a complex combination, or it may have been formed in the soil from fatty or other bodies of a quite different constitution.

759 M. A. SULLIVAN and F. R. REID. **Oxidation in Soil.** — *The Journal of Industrial and Engineering Chemistry*. Vol. 3. N. 1, pp. 25-30. Easton, Pa. January, 1911.

United States

The results of researches made by the writers and others (1):

1) Soils have the power to oxidize aloin;

2) The oxidizing power is increased by adding water up to optimum moisture, by the commonly used fertilizers in conjunction with plant growth, by salts of manganese, iron, aluminium, calcium, and magnesium in the presence of simple organic hydroxy-acids;

3) Oxidation in soil is comparable to oxidation in plants and animals;

4) The oxidative power of the soil appears to be mainly non-enzymotic, the result of interaction between inorganic constituents and certain types of organic matter.

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(1) See Number 60 in this Bulletin of Jan. 1911.

It may be brought about by organic matter in a state of autoxidation and by inorganic oxygen-carriers, such as manganese and iron;

5) Oxidation is greater in the soil than in the subsoil;
6) Oxidation is greater in fertile than in unfertile soils.

760 R. R. Polle. **Influence of Moisture, Manuring and the Physical Condition of the Soil on the Root Development of young Wheat and Barley.** (Ueber den Einfluss verschiedenhohen Wassergehalts, verschiedener Düngung und Festigkeit des Bodens auf die Wurzelentwicklung des Weizens und der Gerste im ersten Vegetationsstadium). — *Journal für Landwirtschaft*, 58 B. H. IV, pp. 297-344. Berlin. März 1911.

Germany Vegetation experiments with *Chevalier* barley and *Bordeaux* wheat in a series of 96 pots. General average results obtained, taking 1 to represent the weight of the roots with regard to that of the aerial parts of the plants.

Soil		Barley	Wheat
Unmanured	moist	1 : 1.56	1 : 1.38
	dry	1 : 0.88	1 : 1.00
Manured	moist	1 : 1.58	1 : 1.54
	dry	1 : 0.98	1 : 1.04
Unmanured	moist	1 : 1.89	1 : 1.64
	dry	1 : 1.03	1 : 1.00
Manured	moist	1 : 2.04	1 : 2.17
	dry	1 : 0.94	1 : 1.10
Unmanured	moist	1 : 1.49	1 : 1.32
	dry	1 . 1.08	1 : 0.88
Manured	moist	1 : 1.56	1 : 1.32
	dry	1 : 1.19	1 : 1.05
Unmanured	moist	1 . 1.52	1 : 1.25
	dry	1 : 1.05	1 : 0.92
Manured	moist	1 · 1.47	1 : 1.37
	dry	1 . 1.22	1 : 1.15

Seed sown: barley, June 11; wheat, July 14.
Harvest: barley, June 21-26; wheat, July 22-28.

These results lead to the following conclusions:

1) Aerial development during the first period of vegetation is influenced essentially by the moisture of the soil.

2) There is greater aerial development in heavy than in light soils; the use of the roller in dry seasons is therefore of great use in favouring the sprouting of the corn.

761 TH. PFEIFFER and E. BLANCK. **Soil-colloids and Phosphate Assimilability. The Influence of Gelatinous Aluminium Hydroxide and of Colloidal Silica upon the Utilization of Phosphorus by Plants.** Über die Wirkung eines Zusatzes von Tonerde- und Kieselsäuregel zum Boden auf die Ausnutzung der Phosphorsäure durch die Pflanzen). — *Mitt. der landw. Institute der k. Universitat Breslau.* VI B., H. II, pp. 316-324. Berlin, 1911.

Germany

Experiments undertaken to ascertain the rôle played by colloidal substances occurring in the soil. Little being known regarding the contents in colloids of soils, these experiments consist in artificially adding definite quantities of gelatinous mineral compounds to a colloid-free soil.

For this purpose Oder-sand was used, being wholly free from colloids, and to this was added pure gelatinous aluminium hydroxide, and colloidal silica.

These experiments also aimed to ascertain the action of frost, of heat and of an electrolyte respectively on the mixture of fertilised sand and mineral "gels", in preparing this soil for vegetable growth.

For the experiments, yellow lupins were used and planted in Oder-sand of which each pot contained 17 kg., the sand being fertilised by di-potassic phosphate (3 grams) and by an aqueous extract (50 cub. cm.) of a sandy soil in which lupins were growing. Some pots were exposed to frost for four days in a refrigerating chamber; in other pots the soil was exposed to heat in an autoclave, for sive hours, under a pressura of steam at 2 to 2 ½ atmospheres. The pots were then sown with lupins on May 6th, the experiments being finally conducted with 12 well developed lupin plants.

The comparative experiments were the following: 1) control experiment without further treatment of the soil; 2) treatment with gelatinous aluminium hydrate (10 grams) and with gelatinous silica (20 grams); 3) treatment with aluminium hydrate and silica as above, with exposure of the soil to cold (—8° C); 4) treatment of the soil with aluminium hydrate and silica as above, and exposure of the soil to heated steam, at a pressure of 2 to 2.5 atmospheres; 5) treatment of the soil with aluminium hydrate and silica, as above, with the addition of 5 grams of calcium chloride. Not only was the growth of the lupins compared in these experiments, as seen in the dry weight of each plant, but the influence of the colloids, and of the different treatments was verified in regarb to the assimilability of the soil-phosphates, measured by the quantity of phoshoric pentoxide determined in the ash of the plants.

Average results of the experiments:

		Dry Matter in the plants		Phosphoric Acid in the plants
Without silica and aluminium hydrate . . .	gr.	110.2 ± 0.7	gr.	0.648 ± 0.022
With » » »	»	102.3 ± 2.0	»	0.367 ± 0.013
With silica and aluminium hydrate and cold .	»	98.9 ± 2.1	»	0.346 ± 0.009
» » » » and steam.	»	87.7 ± 1.1	»	0.324 ± 0.006
» » » » and calcium chloride	»	95.8 ± 0.9	»	0.343 ± 0.008

The experiments lead to the following further conclusions:

1) That absorption combinations do not take place, the phosphoric acid entering into chemical combination with the gelatinous aluminium hydrate and with gelatinous silica.

2) Cold applied previously to the soil had no appreciable effect upon plant-growth.

3) Super-heating the soil affects the fertility, by causing the phosphates in the soil to be slightly les assimilable to plants, the dry weight of which diminished in a very sensible degree (by 14.6 ± 2.3 g.).

4) The addition of calcium chloride was rather unfavorable to phosphate assimilation and to plant growth.

C. E. Bradley. **The Action of Lime and Gypsum as indirecte Potash Fertilizers in some Oregon Soils.** — *J. of Ind. and Eng. Chemistry.* Vol. 2. No. 12, pp. 520-530, Easton, Pa., Dec. 1910. **762**

United States: Oregon

In the first series of experiments large glass percolators having a capacity of about 25 lbs. of soil were filled with the soils, which had been moistened to a good working condition with 20 to 25 % of water.

The fertilizers (lime and gypsum) were then applied and mixed with the soil, the outlet of the percolators closed with a cork, and the top of the soils covered with a layer of paraffin, to prevent evaporation. After standing six weeks, the corks were removed, and the percolators leached with distilled water. For 500 cc. of percolate the results were as follows:

POTASH IN PARTS PER MILLION OF SOLUTION.

	Blank	1 0/0 Lime	1 0/0 Gypsum
Soil No. 1.	2.7	4.7	7.2
» » 2	3.1	4.0	7.2
» » 3	53.5	69.2	88.0

In the second series of experiments, fifty grams of soil were treated in each case with 500 cc. of distilled water, and one gram of lime and gypsum respectively, each of them being entirely potash-free. The material was placed in stoppered bottles and shaken occasionally for 24 hours at room temperature. After filtration through a Pasteur-Chamberland filter, the analysis of an aliquot gave the following results, a blank with distilled water being run in each instance.

POTASH IN PARTS PER MILLION OF DRY SOIL.

	Hours.	Blank	1 gr. Lime	1 gr. Gypsum
Soil No. 1	24	7.7	5.0	31.3
	96	....	5.6	....
Soil No. 2	24	14.0	9.2	37.4
Feldspar (pegmatite) . . .	24	32.3	22.5	51.7

One field has had applications of plaster for 25 years at the rate of 200 lbs. per acre, and still responds readily to this treatment. An examination of this soil, together with the same soil (sandy loam) in an adjoining field not treated with gypsum, gave the following results as regards the solubility of potash in hydrochloric acid solution of 1. 115 density and in a dilute solution $\left(\frac{N}{5}\right)$ of nitric acid:

PER CENT OF POTASH.

	Unplastered Soil	Plastered Soil
Potash sol. in HCl. 1 115 (sp. gr,) .	0 202	0.268
Potash sol. in HNO_3 (N/5)	0.050	0.069

The general conclusion is that for the soils of Western Oregon gypsum acts as an indirect potash fertilizer, while lime does not. Neither of these fertilizers affects the amount of water-soluble phosphates in the soil.

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M. J. BLESE and F. R. FERLE. **Irrigation Studies in Courland.** *Journal Opetnoi Agronomii* (*Journal of Experimental Agriculture*), G. XI, Kniga 6, p. 859. St. Peterburg.

Russian Empire

Experiments on the manure action on meadows of irrigation waters. The author has determined the quantity of residue that is left by evaporation by irrigation waters.

A water for irrigation good when it has a high content of lime, and when the total residue left by evaporation reaches 0.25 gr. the litre. From this point of view the value of the water of the different streams in Courland varies within somewhat wide limits, as experiments have shown during four years.

A flow of 28 litres per hectare and per second for a week, gives:

Dry residue, 718 to 3166 kg.

Lime, about 171 to 666 kg.

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A. BRILINSKI. **Irrigation in the Steppes of Shirwan.** (Jugo-Vostotchnaia tchiast Schirwanskoi Stepi. Bakinskoi Gu b. v. eia oroscienie v. zieliakh Kolonisazii). — *Selskoe Khosiaistvo i Liesovodstvo*, CCXXXIV G. LXX, pp. 687-698. S. Peterburg, Dekabr. 1910.

Russian Empire: Transcaucasia

An irrigation project is studied for the steppes of Shirwan. A surface of 30 000 dessiatines (32 700 hectares) would be brought under irrigation, utilising the waters of the river Kur.

At present a great part of these lands belong to the State, and are let to shepherds at the rate of 7 kopecks per dessiatine, making a total annual revenue of only 2224 roubles. Calculating on the base of a compensation of 1/4 to 1/6 of the harvest per dessiatine of irrigated land sown with wheat, there would be a revenue of 10 to 15 roubles at least per dessiatine. This fact, together with the possibility of more remunerative cultures, such as cotton, shows what an advantage a well-ordered system of irrigation would be both for the State and for the region in question.

765 **The Agricultural Side of Irrigation in the United States.** — *U. S, Dep. of Agric. Office of Experiment Stations. Experiment Station Record.* Vol. XXIII, N. 7. Washington, December, 1910.

United States

Although there are no statistics available regarding the vast sums of money which have been expended in the United States during the past ten years in the construction and improvement of irrigation works by private enterprise, it is estimated that this amount would reach $ 300 000 000.

To this should be added the expenditures of the Reclamation Service, which in eight years have aggregated nearly $ 60 000 000.

At present the question of land reclamation is not so much the construction of new works for additional water supplies, as the wise use of the land and water already available.

It is estimated by field agents of the Experiment Station Office of the U. S. Department of Agriculture that there are at present about six million acres under ditch in the West, but not irrigated for lack of settlers. The common conception is that when the water supply is once furnished the problem of reclamation of arid lands is solved, but in fact the agricultural side of irrigation transcends all others in importance. Large sums have been expended in providing water for land of an inferior quality, and it seems a grave mistake to waste the scanty water supply on poor soil. The character of the soils, the crops which can be grown, the presence or absence of alkali, the formation of hardpan near the surface, and the tendency to become water-logged and to require drainage, are questions the consideration of which is as essential to the success of an irrigation enterprise as is the character of the structures used to provide a water supply. The tendency to ignore the agricultural side of irrigation has likewise resulted in the construction of canals on ground that was too porous to retain water, and in planning and building systems without adequate provision either for maintenance and operation or water distribution and delivery. The water duty has also been arbitrarily fixed by men who knew little of the water requirements of crops, or the needs of the men who are to use the water.

Enterprise after enterprise is being undertaken under the Carey Act, in some of which the cost of water will reach as high as $ 70 per acre, without considering whether the farmers who are induced to settle under these projects can afford to pay so much for a water right.

Again, the providing of an irrigation supply often stops short in its application to agriculture at a very vital point. The usual custom in the past has been to convey water to the highest point of each section of land or to its main subdivision, and leave to men unfamiliar with irrigation the task of planning and building distributaries for the farms; whereas the only safe course to pursue, if success is to be assured, is to plan and construct the irrigation system of each individual farm with the same care and skill that are exercised in the larger features of the plant.

In every attempt to convert desert land into fruitful fields there is a transition period in which the new settler with limited means is forced to confine his efforts at first to the seeding of small patches of grain and the planting of vegetables, and to work into more profitable crops by degrees. In this transition period which marks the passing of the desert plants and desert conditions, and the introduction of profitable crops under irrigation, the new settler is especially in need of help; and the measure of success which a newly irrigated district attains will depend in no small degree upon the assistance which is given to new farmers during the first three years of their fight with the desert. Attention has frequently been called to the waste of water in irrigation in the West. Too much water is used, and there is an inclination to rely too much on water and too little on cultivation. There is great need throughout the irrigated districts not only for more farmers but for better farmers. All over the region individuals, associations and corporations composed of farmers have received from the courts, two, three, and even four times as much water as their crops require under economical use. Until such evils are remedied this region can never hope to possess that extent of irrigated land which its available water would furnish if equitably apportioned. A candid consideration of the present stage of progress leaves no other conclusion than that the material prosperity of the western country is dependent on the better development of the agricultural side of irrigation.

766 **Drainage and Irrigation Works and Sewage Disposal, in the United States during 1910.** — *The Engineer.* Vol. CXI, N° 28, 72, p. 46. London, January, 13, 1911.

United States

The Central States are doing much to reclaim marsh lands, draining them by tile lines and open ditches, with pumping stations and dykes as auxiliary works along the rivers. The State of Illinois alone has some 2 million acres (809 200 hectares) of fine bottom lands, which can be made available by drainage and flood protection. In Arkansas, work is to be started on the drainage of the St. Francis basin or valley, about 1500 square miles (3885 Km ^{2}) This must provide also for flood waters coming from 4000 square miles (10 359 square kilometres) of adjacent territory. In these, special flood channels will be formed by the construction of dykes, this being less costly than to improve the natural watercourses. Lakes within the district will be utilized as regulating basins for the flood waters. Artificial reservoirs to regulate flood waters form part of a flood protection project for the city of Pittsburg and its vicinity. The present channel of the Kaw River will be widened from 450 ft. (137.2 metres) to 750 ft. (228.6 metres), to a depth of 15 ft. (4.57 metres) below low water. There will be 10 miles (16 kilometres) of dykes with a maximum height of 25 ft.

One of the important irrigation works commenced in 1910 was the Engle dam for a great reservoir on the Rio Grande River. The dam will be 265 ft. (80.77 metres) high, of rubble concrete, or concrete filled with « pudding stones ».

The Salmon River irrigation dam, now under construction in Idaho, is of arched form, 220 ft. (67.05 m.) high, 400 ft. (122 m.) long on the top and with a radius of 225 ft. (68.65 m.). Like several other similar dams, it is built in a narrow rocky gorge or canyon.

With the rapid growth of Chicago and the district surrounding it, there is a very important problem as to sewage disposal in order to keep the sewage out of Lake Michigan. An experimental sewage-treatment plant has been in operation for about a year. In November 1910 a branch canal was completed to dilute the sewage of a number of towns and take it to the north of the city.

This is 8 ½ miles (13.679 kilometres) long, 75 ft. to 100 ft. (22.86 to 30.48 metres) wide at the water level and carrying 12 ft. (365.76 centimetres) of water. The flow of 1000 cubic feet (28.315 cubic metres) per second, required for dilution, is obtained by four pumps taking water direct from the lake..

A. BERTRAND. **The World's Nitrogen Market in 1910.** (Le marché mondial de l'azote en 1910). — *L'Engrais*, N. 17, pp 180-191. Lille, 17 février, 1911. 767

In this report, addressed to the Minister of Finance in Chile, the writer re-assumes the aspects of the world's nitrogen market in 1910, and deduces forecasts for 1911. The report is accompanied by 10 tables showing the world's consumption of nitrate of soda and of sulphate of ammonia, the fluctuations of prices, the monthly variations in the prices per kg. of nitrogen in the sulphate and in the nitrate, in Europe, in Chile, etc...

Production and consumption of nitrogen in 1910. — The production of sodium nitrate in Chile rose, in 1910, to 2 470 000 metric tons, an excess of 355 000 tons on 1909. The consumption of this excess is divided between the United States, Germany, France, Belgium and Holland.

The world's production of sulphate of ammonia was valued at 1 117 000 metric tons in 1910, or an excess of 152 000 tons on 1909.

There are no statistics of the production and consumption of calcium nitrate nor for cyanamide, in 1910. The writer puts them at 7000 tons for calcium nitrate and 60 000 tons for cyanamide, which are insignificant figures.

Price of nitrogen in 1910. — The price of ammoniacal nitrogen has been higher this year than that of nitric nitrogen. On the other hand, the variations in the price of sulphate have been as important as those of nitrate, which denotes a want of organisation of the market. The kilogram of nitrogen in Chile nitrate is at the present moment from 7 to 10 centimes cheaper than that in sulphate of ammonia.

Probable consumption in 1911. — There has been considerable increase in the consumption of nitrogenous fertilisers in 1910, and with the growing demand for these manures, especially in the United States, it is likely to increase still further.

A decrease in the consumption of nitrate would mean a retrogression of agriculture, and agriculture can not do without the chemical fertilisers to which her prosperity is so greatly due. The *Money Market Review* says, on this point: "The consumption in Europe and in Egypt is *progressive*, but advances by leaps and bounds, as will soon be the case in the United States... In a few years the amount of nitrates required by the United States will have no limit but that of production".

Probable prices in 1911. — It does not seem likely that the present fall in prices will persist in 1911, unless there should come an unfavourable moment for agriculture. A slight rise in the price of the nitric unit is more likely, because of the general rise of prices of articles of consumption. It is to be hoped that the nitrate producers will combine to regulate production, and to centralise the markets for their product, so as to avoid tiresome variations.

Economic situation of the industry of new nitrogenous fertilisers. — The writer regrets the absence of trustworthy statistics of the production of calcium nitrate. The exportation from Norway is put approximately at 7 000 tons. A possible production of 25 000 to 50 000 tons has been announced, but would not be enough to affect the sale of other fertilisers. On the other hand, if the process of manufacture of calcium nitrate is not considerably improved, so as to reduce the cost price, this industry can only pay in Norway. At present the tendency is rather to produce synthetic nitric acid.

The figures regarding calcium cyanamide are no less uncertain. There are 12 European and 1 American factory, but the production is not great, nor the industry prosperous.

Among new nitrogenous products is sulphate of ammonia extracted from peat, or directly from the air, or by transforming cyanamide; these, and aluminium nitride and other nitrogenous substances for which innumerable patents have been taken, are all still in the experimental stage.

P. Pipers. **Fertilisers and Milk Production.** (Les engrais et la production du lait). — *Contributions à l'étude des engrais chimiques*, publiées par Jules Aeby, 3e livr., pp. 20. Anvers, 1910. **768**

Netherlands

The experiments of Kühn, Wolff, Fleischer, Fjord and Friis., Jordan and others have shown that the composition of forage influences the secretion of milk. Proteids increase the quantity of milk (experiments of O. Kellner); small quantities of fats increase its fat content, experiments of Wolff); carbo-hydrates increase the quantity without affecting the percentual composition of milk. To prevent the exhaustion of milch cows, the daily ration of forage should contain 200 gr. of lime and 100 gr. of phosphoric acid per 1000 kg. of live weight.

The best way to increase the nutritive value of forage is to manure well the meadows. With a view to determining the effects of manures on the quantity and quality of crops, the writer carried on, in Holland, many manuring experiments.

Each experiment comprised three plots: *A*) unmanured; *B*) manured at the rate of 500 kg. of superphosphate and 500 kg. of Patentkali (containing 50 % sulphate of potassium, 40 % sulphate of magnesia, and 2 to 4 % of kitchen salt) per hectare. The results pointed to the following conclusions:

1) Chemical fertilisers greatly increased the yield of hay;

2) The action of nitrogen (150 kg. of nitrate of soda) was more efficacious than that of two mineral manures together: these represented 903 kg. and nitrate 1189 kg. of hay;

3) The chemical fertilisers raise the content of digestible protein from 5.75 to 6 %;

4) Nitrogen increases the quantity of digestible protein in higher proportions (0.25 %) than that of raw protein (0.14 %);

5) The increase of fat produced by mineral manures is represented by 16.05 kg., that produced by nitrate by 21.84 kg. per hectare; the simultaneous use of mineral fertilisers and of sodium nitrate raises the fat content of hay by 37.89 kg. per hectare;

6) The increase of mineral matters produced by sodium ni-

trate is of 75.46 kg., that produced by mineral manures is of 63 33 kg. per hectare.

The average crop on plot	*A*	reaches	3 958	kg
» » »	*B*	»	4 861	»
» » »	*C*	»	6 050	»
Increase per plot	*B*	»	903	
» »	*C*	»	2 902	»

A superficial glance at these figures would seem to show that the total increase obtained is insufficient to pay for the fertiliser used. But their after-action must be taken into account.

In order to study the after-effects of sodium nitrate the writer made a series of 16 experiments, with the following results:

Immediate action of fertiliser	1 426	kg. of hay
After-effects » »	741	» »

Mineral fertilisers have an even stronger after-effect. We may therefore consider the after-effect of the three united manures as equivalent to half their direct action; that is to say, that the total increase due to the fertiliser reaches at least 3 100 kg. of hay per hectare.

769 ED. OTTER, E. HERRMANN and J. STUMPF. **Manure Value of Root Residues of some Cultivated Plants.** (Studien und Versuche über den Wert der Wurzelrückstände verschiedener Kulturpflanzen als Stickstoffsammler und Gründünger). — *Zeitschrift für das Landwirtschaftliche Versuchswesen in Oesterreich,* XIV J., H. 2, pp. 152-174. Wien, Februar, 1911.

Austria The writers, after a critical examination of previous results, have experimented on a large scale, in order to study the effects of green manure, especially in the case of a semi-annual culture of vetches and oats.

For cereal crops following these cultures, the writers calculate that 56 kg. of nitrogen, 70 of potash, 30 of phosphoric oxide and 25 of lime are required per hectare. Now the roots alone of a mixed crop of vetches and oats contain: 90 kg. of nitrogen, 46 of potash, 34 of phosphoric acid and 131 of lime, besides 71 quintals of organic matter per hectare. With the addition of 15 kg. of atmospheric nitrogen and a little mineral fertiliser, these quantities should suffice to feed two generations of cereals, or the corresponding increase of crop during one year. Moreover, considering the remarkable fertilising value of the root-residues of vetches and oats, it would be waste to turn in, besides the roots, the aerial part of the plants, representing 250 quintals of green stuff, worth as manure 315 francs, the content of which in nitrogen of 117 kg. and in ash of 616 kg. would correspond to a complete manure for four years. Such a manure is not however to be recommended, as the fertilising action would be exhausted in the third or fourth year. This green stuff used as forage would yield about half its fertilising value as farm-yard manure.

The ploughing in of complete crops of lucerne and clover would constitute a still greater waste, since nitrogenous matter sufficient to furnish nitrogen to seven annual cereal crops would thus be put into the soil, forming a reserve which could not be utilised after the third year.

The root-residues of leguminosæ yield alone therefore sufficient nitrogen for two cereal crops, without counting the hay used as forage, so that they almost enable the farmer to save the expense of sodium nitrate.

Reckoning 300 kg. of nitrogen in the roots of quadrennial lucerne, 170 kg. in those of biennial clover, and 100 in those of a three months' crop of vetches and oats, the cultivation of leguminosæ equals a manuring with 10 quintals of sodium nitrate per hectare for a period of 3 to 4 years for the cereal crops that follow. So that, with a rotation of $^1/_5$ to $^1/_6$ of leguminosæ it is enough to add potash and phosphoric acid to maintain the balance of nutritive substances in the soil.

Further comparative experiments show that while a sufficient manuring with sodium nitrate gives an average increase of 500 kg. per hectare and no further effect beyond the first year, the nitrate in the roots of leguminosæ gives the same increase gratuitously, and its effect is further prolonged during the two following years.

A. J. DREIMANN. **Manuring Experiments with Peat.** (Udobrenie Semli Torfom. *Semledielez* (*The Cultivator*), 1910 J., N. 3). — *Journal Opetnoi Agronomii* (*Journal of Experimental Agriculture*), G. XI, Kniga 6, pp. 867-868. S. Peterburg, 1910. **770**

Russian Empire

In the experimental field of the Agricultural Society of Sabolotok (Government of Pskow), manuring experiments were made in

1909 with peat, either alone, or associated with mineral fertilisers, in sandy soils sown with barley.

The field, sloping to the east, was divided into 7 plots, having each a surface of 70 sajen² (318 m²; the sajen² = 4.54 m²).

Plot I. — Blank.

Plot II. — 40 cubic sajen (sajen³ = 9.70 m³) of peat per dessiatine (dessiatine = 2.699 English acres = 10 919 sq. m.) or 355 m³ per hectare.

Plot III. — 40 sajen³ of peat + 120 pud (pud = 36 lbs. English, or = 16.38 kg.) of ash + 36 pud of bone meal per dessiatine, or, respectively, 355 m³, 1787 kg. and 540 kg. to the hectare.

Plot IV. — 40 sajen³ of peat + 36 pud of Thomas slag + 6 pud of potassium salts + 6 pud of sodium nitrate per dessiatine, or respectively 355 m³, 540 kg., 90 kg. and 90 kg. the hectare.

Plot V. — 120 pud of ash per dessiatine, or 1787 kg. per hectare.

Plot VI. — 6 pud of potassium salts per dessiatine, or 90 kg. per hectare.

Plot VII. — Complete mineral manure, without peat.

The grain yield of the different plots was as follows:

No	Puds per Dessiatine	Kgr. per Hectare
I	60	892
II	110	1 636
III	180	2 677
IV	200	2 974
V	135	2 011
VI	137	2 020
VII	180	2 677

771 D. BERTHELOT and H. GAUDECHON. **Nitrification by Ultra-Violet Rays, and Industrial Processes for the Oxidation of Nitrogen.** (La nitrification par les rayons ultra-violets et les procédés industriels d'oxydation de l'Azote). — *C. R. de l'Acad. des Sciences*, N. 9, pp. 522-524. Paris, 27 février, 1911.

France Fifty cubic centimetres of an aqueous solution of ammonia at 4 %, in presence of 15 cm³ of oxygen, exposed to the action of ultraviolet rays, give rise to the formation of nitrites, but not of nitrates; oxidation is arrested at the nitrous stage. The ultra-violet rays have produced an action analogous to that of ferments or of living organisms. The same reactions are seen with atmospheric oxygen. The writers obtained nitrification, at the nitrous stage, of aqueous solutions of ammonia salts in the presence of air and the nitrification of organic bodies in presence of air, as also the reversion to nitrous of nitric compounds.

It is therefore scientifically proved that the ultra-violet rays, like ferments, may produce loss or gain of nitrogen, according to circumstances.

The writers consider that this process may eventually contribute to the industrial oxidation of nitrogen at high temperatures, at present limited to a few hundredths in their yield.

C. SCHREIBER. **Diffusion of Nitrates in the Soil. Comparison of Sodium and Calcium Nitrates.** *Nouvelles recherches concernant la question des engrais azotés.* — Année 1909, p. 23. Namur, 1910. **772**

Belgium

I. *Diffusion of sodium nitrate in the soil.* — The writer takes his observations (carried out since 1895) on the circulation of water in the soil during the active period of vegetation, as well as his direct cultural experiments on the best time and method for applying sodium nitrate, to show that sodium nitrate is not so subject to continual losses under the influence of rains as is generally thought.

Mr. Schreiber concludes from a repetition of his experiments in 1909 that there is no objection to the application of sodium nitrate two or three weeks before sowing in heavy soils, and a few days before sowing in sandy soils, nor to its incorporation by cultivating.

Sodium nitrate, very soluble in water and not fixed by the absorbing properties of the soil, is yet not washed down very far, because, as Messrs Müntz and Gaudechon have shown, when saline manures are given to soils in a state of relative dryness, the salt attracts the water in the soil and forms a solution which remains localised for a long time, forming a moist centre. Even in damp soils, the diffusion of the salt does not take place for weeks or even months. This slowness of diffusion seems due to the fact that the soil is not uniform in texture.

II. *Comparison between sodium nitrate and calcium nitrate in soils poor in potash.* — The experiments of 1909 were carried out in river deposits, the one clay the other sandy, both very poor in directly absorbable potash. Sodium nitrate and calcium nitrate were compared, at first without addition, afterwards with an insufficient addition, of potash. Comparison was made with cultures with complete manure.

The writer was led to conclude that for poor soils, or those deficient in absorbable potash, sodium nitrate is generally to be preferred to calcium nitrate (supposing the unit of nitrogen to be at the same price), because the sodium takes the place of potash.

773 C. S. CATHCART. **The use of Nitrate of Soda in Commercial Fertilizers.** — *Journal of Industrial and Engineering Chemistry.* Vol. 3, N. 1, pp. 30-32. Easton, Pa. January, 1911.

United States

Experiments to determine:

1) If there is a loss of nitrogen in mixtures containing nitrate of soda;

2) whether nitrate of soda causes the fertilizers to become pasty, thus causing trouble when used in the drill.

The general conclusion would seem to be that if the materials could be left dry, the actual loss of nitrogen would not be of great importance, but that an appreciable loss occurs when there is an absorption of moisture.

The absorption of moisture which makes the mixtures pasty depends on the presence of chloride of potassium which in this case is proportional to the percentage of potash.

774 H. W. HARVEY. **Composition of Soot.** — *The Journal of Agricultural Science,* Vol. III, Part 4, pp. 398-399. Cambridge, December 1910.

Great Britain

The value of soot as a manure depends upon the ammonium salts which it contains, as well as upon its beneficial effect on the texture and colour of the soil, and its power of diminishing the ravages of slugs and small snails upon a young crop. Investigations were carried out in order to throw some light upon the relation of the general characteristics of a sample of soot and its nitrogen content. The following table shows a relation between the nitrogen content and the weight per bushel of the soots examined. It further indicates that there is some loss when the soot is allowed to stand in a loose heap, as in the case of the three mixed samples. A small amount of ammonia was found to be given off when air was drawn through a tube containing soot.

Origin of the sample of soots	Percentage of nitrogen	Lbs. of soot per bushel loosely packed		Lbs. of nitrogen per bushel of soot	
			Idem kg per Hl.		Idem kg. per Hl.
Kitchen chimney.	11.0	9	11	1.0	1.25
Sitting Room chimney	5.5	18½	23	1.0	1.25
Kitchen chimney	5.4	23	30	1.2	1.50
Coal and wood fire.	4.5	26	33	1.2	1.50
Dwelling houses (mixed).	3.6	29	38	1.0	1.25
Low cottage chimney	3.14	33	41	1.0	1.25
Dwelling house (mixed)	2.9	28	34	0 8	1.00
Dwelling house (mixed)	2.7	27	34	0.7	0.8
A 40 ft boiler shaft	.5	47	58	0.23	0.3

It has been generally accepted by farmers that a light soot is the best; this is well borne out by the above table. This points to the conclusion that soot should be bought by volume and not by weight for then the buyer is more likely to get an approximately constant quantity of nitrogen per bushel. A bushel of fresh light soot is worth about sixpence for its fertilising value alone (frs. 1.40 per Hl.) regardless of its beneficial action upon the soil and its special power of deterring insect pests.

HJALMAR VON FEILITZEN. **Azotogene, Nitragin, or Inoculation with Natural Soil? Inoculation Experiments in the Culture of Several Leguminous Crops in the Peaty High Moors** (*Hochmoor*) **of Sweden.** (Azotogen, Nitragin, oder Naturimpferde? Impfversuche zu verschiedenen Leguminosen auf neukultiviertem Hochmoorboden. Versuchsstation des Schwedischen Moorkulturvereins zu Jönköping). — *Centralblatt für Bakteriologie, Parasitenkunde u. Infectionskrankheiten,* mit 4 Tafeln u. 2 Abbildungen im Text, 29 Bd. N. 618, pp. 198-205. Jena, 4 Februar, 1911. **775**

These new experiments at the Agricultural Station of Flahult **Sweden**
are a continuation of others already published by the writer, beart

ing on the culture of lupins in the virgin soil of high moors (*Hoch Moor*) inoculated with nitrobacterin, with nitragin, and with natural inoculation soil. The results were in favour of the natural soil and not of nitragin, and led to the present experiments. The Azotogene of M. Humann and Dr Teisler of Dohna, near Dresden, was used again. The cultures chosen were soy beans, yellow and blue lupins, *Ornithopus sativus* and *Trifolium hybridum*. At first the soy beans developed pretty well, but they were destroyed by a slight frost, —1° C. The *Ornithopus sativus* and the *Trifolium hybridum* grew so slowly that they were never sufficiently grown to be mown. The lupins, on the contrary, developed very well, and were only injured at the end of September by frost. The quantity of green product, per plot of 2 m.^{2} is shown in the following table:

	Blue Lupins		Yellow Lupins	
	Grams	Average gr.	Grams	Average gr.
Non-inoculated peat	505 475	490	380 210	295
Inoculated with Nitragin and limed, and manured 3 weeks before inoculation.	335 490	412.5	350 210	280
Inoculated with Nitragin and limed, and manured immediately before inoculation.	380 645	512.5	400 310	355
Inoculated with Azotogene.	2650 2300	2475	2950 3810	3380
Inoculated with natural inoculation soil.	2900 2100	2500	3350 4290	3820

The natural inoculation soil was shown to be an efficacious means for obtaining a normal crop of lupins and other leguminosae.

The natural inoculation soil of *Phaseolus vulgaris* did not cause either assimilation of nitrogen or formation of tubercles on the roots of soy beans.

The Azotogene of Dr Simon, of Dresden, was shown to be very efficacious with all the cultures under experiment: soy beans, lupins, *Ornithopus vulgaris* and *Trifolium hybridum*, and had the same action as the natural inoculation soil.

The Nitragins of Dr A. Kühn of Cologne gave uncertain results in these experiments also, and in the majority of cases no result at all.

W. H. WAGGAMAN. **A Review of the Phosphate Fields of Florida. —** *U. S. Department of Agriculture, Bureau of soils*, Bull. N. 76, pp. 1-23, Washington, 1911. **776**

United States

Grave fears have been expressed that a serious dearth of available phosphates is imminent. It is however debatable whether there is any reason for fearing a world-shortage of rock phosphate. The problem is that of the elimination of waste or its reduction to the lowest possible point. At present, it appears that this problem must be worked out in connection with the Florida deposits. There are two commercially important classes of phosphate rock in Florida — the hard-rock phosphate and the land-pebble phosphate. The hard-rock phosphate fields extend north and south along the west coast of the peninsula for a distance of 160 km., the present land-pebble phosphate region lies south of the hard-rock fields.

Both the hard-rock and pebble deposits of phosphate belong to the tertiary period. The methods of mining these two classes of phosphate rock differ considerably. In the hard-rock workings the material is either dug out or dredged. In the pebble deposits hydraulic mining is employed.

Practically all the hard-rock phosphate is shipped abroad and sold on a guarantee of 77 per cent. tricalcium phosphate. The pebble phosphate is used both in the United States and in other countries, being sold on guarantees ranging from 60 to 75 per cent tricalcium phosphate.

In order to remove the impurities, the material which comes from the mines is put through a washing process, during which much valuable phosphate is washed away. It is estimated that the actual amount of phosphoric acid lost in preparing the rock for the market is nearly twice as great as the quantity saved. Possible means of utilizing this waste material are suggested, namely, to apply it to muck soils deficient in phosphoric minerals or to extract the phosphoric acid from it by means of a cheap solvent. The average cost of preparing hard-rock phosphate for the market is not less than 17.50 fr. per metric ton, while the finished pebble product costs about 10 fr. per metric ton.

Early in 1910 there were 20 companies operating in the hard-rock regions, with a total annual capacity of more than 750 000 tons. In the pebble regions 15 companies were engaged in mining operations, with a capacity of 1500 000 tons per annum. Owing to various causes, the hard-rock industry was at a rather low ebb during 1909 and 1910, many plants being entirely closed, but the situation is expected to improve. The pebble industry, however, has been growing uninterruptedly and promises to continue to increase.

The life of the hard-rock phosphate is variously estimated to be from 20 to 100 years; the deposits of land-pebble phosphate are considered almost inexhaustible.

777 LEZ SAPARTOVITCH. **Potash Residues as Manure.** (K. Voprosu Ispolsovania, Kak Udobreniia, otbrosov bivscik patascnik Savodov). — *Khosiaistvo* (*The Home*), God. VI, N. 3, pp. 69-71. Kiev, 20 Januar, 1911.

Russian Empire

Potassic residues accumulated in large quantities in places where potash was formerly leached ont of wood-ashes, could be utilised. Potash was formerly extracted in Russia from the ash of forest trees, and these residues remained after extracting the ashes with water. These residues have the following composition:

	Ash collected in the neighbourhood of Balin %	Ash collected near [illegible] %
Lime (Ca O)	17.69	22.91
Potash (K_2O)	0.366	1.03
Soda (Na_2O)	0.075	0.04
Phosphoric oxide (P_2O_5)	1.28	1.63
Phosphoric oxide soluble in citric acid	1.28	1.52
Loss during calcination	19.55	—
Residues insoluble in HCl	56.54	—

With a potash content of over 1 %, 450 *pud* (7371 kg.) of these residues are equivalent to 30 *pud* (492 kg.) of kainit; they may thus very well be used as a potassic manure. Regarding their content of phosphoric acid, 200 *pud* (3276 kg.) of residues are equivalent to 24 *pud* (393 kg.) of Thomas slag at 16 %. The percentage of lime is especially remarkable, as the table shows, so that 750 *pud* (12 283 kg.) of residues are sufficient to manure one *dessiatine*, or 1.09 hectares. These facts are important because the old potash works are within the zone of the forest lands, which are very poor in lime.

A New Mineral yielding Potassium Sulphate. (Un nouveau minéral fournissant du sulphate de potasse). — *L'Engrais*, N. 10, p. 272. Lille, 10 mars, 1911. **778**

Spain: Almeria

In prospecting for aluminium ores in Spain, an interesting mineral has been discovered in the Province of Almeria, out of which aluminium, potassium sulphate and alum may be obtained. It is transformed into a commercial product by calcination and washing with water; after calcination it contains 62 to 70 % of alumina and 25 to 30 % of potassium sulphate. Several veins of this mineral have been discovered, and extraction is easy and not costly. It is called " Galafatite ".

M. BRIEM. **Common Salt as Manure for Beets.** (Kochsalzdüngung zu Rüben). — *Monatshefte für Landwirtschaft*, IV J., H. 2, pp. 52-58. Wien, Februar, 1911. **779**

Austria

After critical examination of all former experiments and results, the writer concludes that a moderate application (1 quintal per hectare) of kitchen salt to beet is of proved utility, provided there is sufficient quantity of all the nutritive elements, and that improved beets (*Elite-Rüben*) are used, which concentrate in their leaves the sodium and chlorine harmful to sugar-making. The application of sodium chloride is especially useful when nitrogenous manures, that do not, contain sodium are used, such as calcium nitrate, calcium cyanamide and ammonium sulphate.

780 T. B. WOOD and F. J. M. STRATTON. **The Interpretation of Experimental Results.** — *The Journal of Agricultural Science*, Vol III, Part 4, pp. 417-440. Cambridge, December, 1910.

Great Britain

Attention is drawn to the need for caution in interpreting experimental results.

Frequency curves are discussed chiefly from the point of view of their bearing on the legitimacy of averaging results. The method of calculating probable error is described and its meaning explained.

The application of probable error methods to questions of sampling for analysis, to field experiments and to feeding experiments is illustrated by instances.

The probable error of one animal on a fattening ration is found to be about 14 per cent of the live-weight increase produced, from which it is calculated that to obtain a precision of 10 % in an ordinary feeding experiment 29 animals must be fed on each ration. The probable error of field experiments is investigated by two independent methods and found to be about 5 % of the crop. This figure is shown to be independent of the size of the plot employed, provided this is $\frac{1}{50}$ acre or larger. A table is given showing the number of duplicate plots which must be employed to give any desired precision in the result. It is also suggested that accurate results may be obtained by employing large numbers of very small plots, even as small as one square yard. This method is useful for nursery work in testing the cropping power of new varieties of cereals where very little seed is available.

781 ROBERT STEWART. **Nitrogen and Humus Problem in Dry Land Farming.** — *The Dry Farming Congress Bulletin.* Spokane, Wash., Vol. III, N. 23, pp. 622-627. December 1, 1910.

United States: Utah

The history of scientific agriculture has taught that the cropping of land to the same crop causes a decrease in the nitrogen and humus content of the cultivated soil and that summer fallowing is even more destructive to these constituents than continuous cropping itself. (Déhérain, Lawes and Gilbert, Snyder, Ladd, Alway, Turnball, etc). These results were obtained in humid or sub-humid regions. A few investigators (Berthelot, Lawes and Gilbert, Alway and Vail), on the other hand, have found that in particular conditions the nitrogen and humus content of the soil has increased.

To see the effect of Dry Farming upon the nitrogen and humus of dry land soils, the writer experimented at Cache Valley, Utah.

The soils studied are derived from the neighbouring mountain ranges which are composed largely of limestone and quartzite, therefore they are rich in calcium and magnesium carbonates.

The results are summarized in the following table, where total nitrogen and humus are reported as per cent of dry soil, and nitric nitrogen as part per million of dry soil.

Crop	Depth of Simple		No. of	Total	Nitric	
	Inches	Centimetres	Analysis	Nitrogen	Nitrogen	Humus
Wheat land	0–12	0—30.48	27	0.2055	0.80	2.67
Virgin »	0—12	0—30.48	22	0.1984	1.04	2.45
Alfalfa »	0—12	0—30.48	11	0.2009	1,74	2.27
Wheat »	12—24	30.48—60.96	24	0.1466	0.76	2.45
Virgin »	12—24	30.48—60.96	19	0.1823	1.38	1.99
Alfalfa »	12—24	30.48 - 60.96	11	0.1604	0.60	1.73

The conclusions would be:

1) The cropping of Dry Farming land in Cache Valley to wheat, either by the summer fallowing method or by continuous cropping, does not decrease the nitrogen or humus of the surface foot (30.48 centimetres) of soil.

2) The second foot of grain-cropped land contains less nitrogen and humus than does the second foot of the adjacent virgin soil.

3) The observed phenomenon in the case of grain-cropped land is probably due to the addition of nitrogen to the surface foot from lower depths and the addition of humus from the added straw.

4) The work indicates that in a study of the nitrogen and humus problem in dry land farming attention must be paid to greater depth of soil than the traditional ploughed surface.

PAUL BAKONYI. **Dry Farming in Hungary.** — *The Dry Farming Congress Bulletin*, Vol. III, N. 23, pp. 467-472. Spokane, December 1, 1910. **782**

Hungary

The National Hungarian Agricultural Society has formed a committee to study the different methods of prevention o drought and to tabulate the result of the experiments made.

The Hungarian Royal Agricultural Academy at Debreczen has made some instructive experiments in Dry Farming, for instance:

For packing ploughed soil it has tested the original Campbell's sub-surface packer, the working width of which is 82.8 inches (210.31 cm.) with 16 wheels of 20.8 inches (52.83 cm.) diameter and a total weight of 280 kilograms, and has ascertained that the Kuhne machine is more practical. The working width of this sub-soil packer is 80 inches (203.2 cm.) it has 14 wheels of 28 inches (71.21 cm.) diameter and weighs 450 kilograms.

With the American machine the driving power of one pair of yoke animals cannot be made the most use of, while with the Kuhne machine two pairs of yoke animals are necessary, and for this reason it is preferred.

In ploughing 6.8 inches (172 mm.) depth the soil was thrown up to 10.4-10.8 inches (264-274 mm.) and was packed by the surface packer to 8 - 8.4 inches (203-213 mm.). At another of these experiments, by manuring with stable manure and ploughing to a depth of 6.8 inches (172 mm.), the soil was thrown up to 12.4 inches (315 mm.) and settled down after packing to 8.8 inches (223 mm.). In a stratum of 8 inches (203 mm.) of vegetable sandy soil on the Academy testing ground 1 per cent of water was equivalent to 48 quarters (13 957.48 litres) otherwise 0.0945 inches (2.4 mm.) of rain.

The results of 736 experiments established the fact that cultivation on the principle of the new teaching retains to a considerable extent the moisture of the soil, especially when the disc harrow anticipates the plough, and also afterwards until ploughing and from ploughing till sowing, when the surface of the soil is permanently loosened by the ordinary harrow.

Millet Experiments. Millet was sown on a stubble field of hairy chickling vetch and rye. Between June 5th and June 11th. the rainfall was 0.543 inches (13.57 mm.). At the latter examination there was per katastral hold in the disc-harrowed soil 192.5 quarters (972.68 hl. per hectare), in the ploughed and packed soil 178.7 quarters (902,95 hl per ha.), and in the disc-harrowed, ploughed and packed soil 505.2 quarters (2552.72 hl. per ha.) more water than in the stubble field ploughed soil which had not been disc-harrowed.

The difference in the crop of millet was as follows: after stubble field ploughed, 4302 lbs; after disc-harrowing and ploughing 5912 lbs.; after ploughing and packing, 4522 lbs.; after disc-harrowing, ploughing and packing, 7192 lbs. per katastral hold or respectively 33.86; 46.53; 35.59 and 56.61 metric quintals per hectare.

The hay yielded by the disc-harrowed and packed soil was 2890 lbs. more than the stubble field crop, 1280 lbs. more than the crop of the merely disc-harrowed part and 2670 lbs. more than that of the ploughed and packed part of the field (22.75; 10.07 and 21.01 metric quintals per hectare).

Maize Fodder Experiments. — The ploughing of the stubble field in the autumn did not take place, on account of the very early frost.

On April 7 and 8 one-half the field was disc-harrowed and afterwards cultivated, the other half remaining as before. The whole was ploughed May 5 and 7, after stable manuring, and one half of the disc-harrowed and ploughed portion was packed, the whole being afterwards cultivated. The maize fodder was sown in thick rows.

It was verified that more atmospheric deposit will filter into loosened soil. From one day's rain the ordinary ploughed soil received 204.6 quarters rain and the disc-harrowed soil 409.09 quarters per katastral hold. After a mouth, in June, there remained, per katastral hold, 433.1 quarters more moisture in favour of the disc-harrowed, ploughed and packed soil over the ordinary stubble field, and 120.3 quarters per katastral hold more than in the disc-harrowed soil.

The difference in the crop was as follows: Of green maize fodder there grew per katastral hold in the ordinary soil 2910 lbs., in the disc-harrowed soil 3374 lbs., in the disc-harrowed and packed soil 4123 lbs.

Autumn ploughing: wheat; barley, oats and potatoes. Another experimenter disc-harrowed the soil two or three times and sowed wheat (after turnips). In 1909 the crop on the neighbouring estate was 50 to 90 lbs. but on the ground in question 180 to 270 lbs.

On the autumn ploughed land he sowed spring barley and oats, the land having been packed and harrowed in the spring. Both came up very thick. This land was twice harrowed. From the barley he obtained 397 lbs. and from the oats 330 lbs. per acre (444.64 and 369.6 kg. per hectare), while the neighbouring land yielded only 220 lbs. (264.4 kg. per hectare) of barley in the most favourable case.

He planted potatotes in sandy soil, which was disc-harrowed in the spring, and packed after ploughing. The planting was done by hoes, in rows, and the soil was cultivated five times with the cultivator and twice with a scuffler, (1) but it was not filled in. The yield was 214 lbs. per Hungarian hold (167.44 kg. per hectare). In another instance, in which the soil was disc-harrowed and packed after ploughing, it was operated on five times by the cultivator, hand-hoed, raked and slightly filled-in, the crop being 287 lbs. per Hungarian hold (225.9 kilograms per hectare).

Maize. Maize was sown in sandy soil at a distance of 1 metre apart. The soil was ploughed, packed and harrowed, and at sowing time was permanently loosened After the appearance of the maize above ground the soil was harrowed as long as possible and afterwards the scufflers were used lengthwise and cross-wise as long as possible without damage. In the sandy soil the yield was 441 lbs. of maize per acre; in the black soil 728 lbs. (347.11 and 573 kgr. per hectare).

Fodder Turnips. Before the autumn ploughing for fodder turnips, the soil was disc-harrowed; in the spring it was packed, and until sowing it was harrowed. At the sowing small press rollers were driven behind the tubes of the sowing machine. The turnip plants on their appearance above ground were gone over once or twice by the scuffler. The crop was 3815 lbs. on an area of 4 ½ hold (667.28 kilograms per hectare).

788 THEODORE KRYSHTOFOVICH. **Russia's Contribution to America's Dry Farming.** — *The Dry Farming Congress Bulletin*, Vol. III, N. 23, pp. 489-491. Spokane, December 1, 1910,

Russian Empire

Some kinds of Russian wheat give satisfactory yield under 12 inches (304.8 millimetres) and even under 10 inches (254 millimetres) of rainfall, and besides produce an excellent grain, fair looking, plump and with high per cent of gluten. In 1889 Mark A. Carleton, of the U. S. Department of Agriculture, introduced from Russia into the United States the red spring wheats, the hardy wheats, and the macaroni wheats, (Ghirka, Kubanka, Beloglino, Ulka, Don, Beloturka, Gharnooka, Arnautka and Pererod). These began to spread over an area that never before had been under wheat culture, a dry area with a rainfall of 10 to 12 inches (254 to 304.8 millimetres).

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(1) Dutch or push hoe. [*Ed.*]

Some of these wheats showed themselves resistant not only to drouth, but also to cold and they have been introduced into the North-western States and into Canada.

At Highmore (South Dakota Experiment Station) Kubanka wheat has produced the highest average yield of the *durum* wheat, 22.4 bushels per acre (20.16 hectolitres per hectare).

The best varieties of oats suited for dry land conditions are Russian kinds, and leading them are the Kherson or Sixty-day oat,

As to barley, Mr. Cecil Salmon of the South Dakota Experiment Station finds the Odessa and Minnesota N. 6 apparently the best.

Another important crop for dry lands is Siberian millet (1). This plant is proving valuable on account of great resistance to drouth and its short season.

Russian spelt (2), Russian buckwheat (3) and Russian broom corn millet (4) yielded more than any varieties previously grown in the North Dakota Exp. Station. At Tulare (California Exp. St.) a white broom corn millet from Tashkend, Russian Turkestan, was more resistant to drouth and alkali than wheat.

The Turkestan alfalfa has shown remarkable drouth and cold resisting qualities.

Many kinds of Russian apples, introduced and tested in the United States, possess here the same drouth and cold resisting properties they have developed in their native country.

A. KOL. **Dry Farming Experiments in Russia** — *The Dry Farming Congress Bulletin.* Vol. III N. 23, pp. 678-680. Spokane, Wash. Dec. 1, 1910. **784**

Russian Empire

In 1908 the writer began Dry Farming experiments at the Werchnedneprovowsky Experiment Farm, near Ekaterinoslaw.

In 1909 the rainfall was 13 inches (330.2 millimetres) of which 7 inches (177.8 mm.) fell between March and July, while between July and October there were only 1½ inches. In April, May and

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(1) *Panicum miliaceum,* Linn. (MARRO, *Coltivazione delle piante erbacee,* Roma, 1909, p. 278). [*Ed.*]

(2) *Triticum spelta,* Linn. *Ibid.* p. 211). [*Ed.*]

(3) *Fagopyrum tataricum,* Gaertn. (*Ibid.* p. 312). [*Ed.*]

(4) *Panicum miliaceum,* Linn. (BAILEY, *Cyclopedia of American Horticulture,* London, 1902). [*Ed.*]

June strong and dry winds are usual. Under such conditions the grain crops, grasses and vetch usually fail, while the longer lived crops, such as sorghums, German millet and maize do not suffer so severely from the spring drouth and they have plenty of rain and sunshine later on to make a good yield.

The yields of the several crops were as follows:

Early Maturing Cultivated Crops.

	1908		1909	
	Per acre	Per hectare	Per acre	Per hectare
Spring wheat...	15 bush.	13.5 hectol.	24 bus.	12.6 hectolitres
Vetch and oats, for hay......	1-3 tons	25-1-75.3 m. q.	1 ton	25.1 m. quint.
Alfalfa	Winter killed	—	1 ton	25.1 ,, ,,

Late Maturing Cultivated Crops.

	1908		1909	
	Per acre	Per hectare	Per acre	Per hectare
Maize	4 tons	100.4 m. quint.	3 tons	75.3 m. quint.
Sorghum for fodder	4 tons	100.4 m. quint.	4 tons	100.4 m. quint.
Maize, grain	70 bush.	63 hectol.	60 bush.	54 hectolitres
Sorghum, grain..	35 bush.	31.5 hect.	35 bush.	31.5 hectolitres
Millet, hay......	4 2/3 tons	119.225 m. q.	4 tons	100.4 m. quint.
Rape, cured as hay	—	—	1 ⅓ t.	33.38 m. quint.
Thousand-headed kale, green....	—	—	15 tons	376,5 m. quint.
Mangel-wurzel...	—	—	20 tons	502 ,, ,,

Legumes.

	1908		1909	
	Per acre	Per hectare	Per acre	Per hectare
Flat peas (*Lathyrus sativus* ...	23 bush.	11,6 hect.	30 bush.	27 hectolitres
Beans (*Phaseolus vulgaris*)	17 1/2 ,,	15.75 ,,	39 ,,	35.1 ,,
Lentils (variety Dimui)	15 ,,	14.5 ,,	25 ,,	22.5 ,,
Chick peas	17 1/2 ,,	15.75 ,,	13 1/2 ,,	12.15 ,,
Cow peas	18 ,,	16.2 ,,	13 ,,	11.7 ,,
Soy beans......	10 ,,	9 ,,	15 bush.	14.5 hectolitres
Cow peas, for hay	—	—	1 1/2 tons	37.65 m. quint.
Soy beans, for hay	—	—	1 ton	25.1 ,, ,,

In 1908 some plots were sown in close drills to both millet and sorghum and some in rows 10 inches apart and twice cultivated with the garden hoe. The yield of millet was 25 % grater on the cultivated plots than on the uncultivated and the same percentage of increase was obtained with wheat. The Hungarian millet yielded 64 % more after cultivated field beans than after cultivated sorghum, while other millet was 11 % better after maize than after sorghum. The cultivation of rape and the pasturing to sheep increased the yield of Hungarian millet, compared with the millet on sorghum ground to the almost negligible amount of 1.36 %. An increase of 60 % by introducing legumes in rotation is very common. The yield of Hungarian millet sown in 1908, 10 inches (25 cm.) apart and cultivated twice was 64 % greater than that of the close planted and uncultivated millet.

Manure, if well ploughed under, increased the maize yield 8 % and the sorghums 18 % or better. The next year the millet that was sown after the manured sorghums gave 27 % better yield.

ROMULO ESCOBAR. **The New Agriculture in Mexico.** — *The Dry Farming Congress Bulletin*. Spokane, December 1, 1910, Vol. III, N. 23, pp, 487-488. **785**

Mexico: Chihuahua

Dry farming has been practised in the Republic of Mexico since before the discovery of America. During the last years the improved system of Dry Farming was experimented in the northern part of the State of Chihuahua, where there are about 10 inches (254 millimetres) of rainfall, most of it between Aug. 1 and Oct. 1, the altitude being of about 3300 feet (1005.84 metres); there are very strong dry winds from the northwest. There the improved varieties of maize grown in the United States have always failed, and local varieties do better, especially those called « temporal ». Beans, of which there are in Mexico a great many varieties, will always be here a very important crop for Dry Farming, due to their being one of the staple foods and to the rapid development of the plant. Of the sorghums that were tried, from the Jerusalem corn (1) and

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(1) The various cultivated varieties known as Sorghum, Broom Corn, Kaffir Corn, Jerusalem Corn, Milo Maize, Durra, etc. are considered as having been derived from the wild species *Sorghum Halepense* (*Andropogon Halepensis*) Others consider these cultivated forms as varieties of a distinct species, *Sorghum vulgare* (*Andropogon Sorghum*), BAILEY. *Cyclopedia of American Horticulture*, London, 1902 [*Ed*]

Amber corn (1) to Schallu (2), there is not one that gives better results than the Milo maize. The sulla (*Hedysarum coronarium*) has proven to be in Mexico a good plant, especially for those low regions where alfalfa cannot be grown with success. The moth bean (*Phaseolus aconitifolius*) a leguminosa specially adapted to dry regions has given good results in limited experiments and seems to be a good forage plant.

In the writer's opinion, the study of the local flora will be one of the best resources for the advancement of Dry Farming.

786 MARCEL MALCOR. **Dry Farming in Algeria.** — *The Dry Farming Congress Bulletin.* Vol. III, N. 23, pp. 483-486. Spokane. December 1, 1910,

Algeria

North Africa is one of the oldest countries where Dry Farming has been successfully practised, for real Dry Farming has been the source of wealth in that « Africae Provincia », one of the richest in the Roman Empire during the third and fourth centuries.

We have to look to the Romans as our first teachers in the art of Dry Farming. Pliny, advocating for the North African farmer 7 and 8 shallow ploughings, had precisely in sight the conservation of moisture in the soil by the same shallow cultivation as in our summer fallowing. Through centuries such fruitful practices have fallen into oblivion.

Forty years ago summer fallowing, with two or three shallow ploughings during the dry months, was advocated in Algeria, and it is now the favourite method in most parts of the country where the rainfall is below 20 inches. Where the rainfall is heavier, it is customary to alternate wheat with an intertilled crop. The use of drill seeding for grains is very new in Algeria and Tunis and many farmers hesitate to employ the drill because it can be used only on well tilled land. The Algerian fields are infested with the Bermuda grass (3), whose growing season is in the summer months, and shallow cultivation in that season tends to cultivate the Bermuda grass more and more.

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(1) An early variety of the saccharine sorghums. (Ibid.) [*Ed*]

(2) The vernacular name, in Decan, of the " Sorghum saccharatum ", Pers. (Watt, *Dictionary of the Economie Products of India*' London, 1893, Vol. VI, Part. III, p. 284). [*Ed.*]

(3) *Capriola Dactylon* (BAILEY, *Cyclopedia of American Horticulture*. London, 1902) [*Ed.*]

The number of wheat or barley varieties grown even on small areas of land is high, so that it is very difficult, and has only recently been attempted, to secure pure seed in the country. Sulla or Spanish alfalfa (*Hedysarum coronarium*) has proved very useful in renovating the land, but it is only an annual crop, destroyed by the summer fallow. Alfalfa would be the most valuable crop, but now it is grown only on irrigated lands.

By tree-culture the best improvement has been effected in the more dry land and apparently desolated country; 500 000 acres (202 300 hectares) have been planted with olive trees in less than 15 years in the district of Sfax, where the rainfall is below 10 inches (254 millimitres) and on what was practically a desert.

G. BOHNTIGNSKY. **Cereals Cultivated with the Demtschinsky Method.** (Zusammenfassung unserer Versuche mit der Demtschinskyschen Getreidekulturmethode). — *Illustricrte Landwirtschaftliche Zeitung*, 31 J. N. 3-5, pp. 13-14. 29-31; fgs. 3. Berlin, 11-18 Januar, 1911 (1). **787**

Austria

The experiments made in 1909 with summer cereals cultivated according to Demtschinsky's method had not been very successful. Only with oats had there been a slightly favourable result.

In order to test this method on winter cereals also, it was applied in 1909 to winter wheat and winter barley.

In the spring of 1910 the experiment with oats was repeated.

The following tables give the results of the various tests.

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(1) Compare with experiments by L De Grully, this *Bulletin*. Nov. 1910; p. 46.

WINTER BARLEY.

Sown: September 17 — Harvested: June 20.

CULTIVATION method	Grain	Stools per m.^{2}	Stalks per m.^{2}	Stalks per stool	Length in centimetres stalks	Length in centimetres ears	Grains per ear	Qls. per hectare straw	Qls. per hectare grain	Weight of Hectolitre Kg.
Normal	120	95.8	431.5	4.5	126.3	3.9	41.0	39.2	24.2	58.3
Zehetmayer culture .	76	43.5	318.0	7.3	118.0	4.6	47.0	40.1	22.1	62.5
Earthing up		23.5	333.0	14.1	136.0	5.3	48.0	39.0	22.7	61.4
Deep sowing (*vertiefen*)		23.0	265.0	11.5	136.0	5.3	50.1	34.7	21.2	62.0

WINTER WHEAT.

Sown: September 7 — Harvested: July 12.

CULTIVATION method	Grain	Stools per m.^{2}	Stalks per m.^{2}	Stalks per stool	Length in centimetres stalks	Length in centimetres ears	Grains per ear	Qls. per hectare straw	Qls. per hectare grain	Weight of Hectolitre Kg.
Normal	100	37	407	10.0	131.1	6.0	—	59.7	18.2	75.7
Zehetmayer		40	359	8.9	122.5	6.3	—	53.8	19.1	76.0
Earthing up		25	370	14.8	139.3	6.5	—	59.5	19.5	76.4
Deep sowing (*vertiefen*)		27	283	10.0	119.1	7.9	—	51.0	17.0	77.0

Thus it appears that the new methods of culture do not produce any advantage with winter cereals.

OATS.

Sown: March 11 — Harvested: July 23-2[illegible].

CULTIVATION method	Grain	Stools per m.^{2}	Stalks per m.^{2}	Stalks per stool	Length in centimetres stalks	Length in centimetres ears	Grains per ear	Qls. per hectare straw	Qls. per hectare grain	Weight of Hectolitre Kg.
Normal	100	176	292	1.6	106	—	33.7	22.3	13.5	48.4
Earthing up.	60	63	181	2.8	130	—	61.5	34.1	16.6	43.1

From the general result of these experiments the writer concludes:

1) With the new methods of cultivation for cereals (Demtschinsky, Zehetmayer) a higher production per plant is obtained, but the yield per hectare is not larger than with ordinary methods;

2) Of cereals, the oat is the one to which these methods seem best adapted, although higher yields are not always ensured; in 1909 the only increase obtained was of 3 quintals of straw.

3) Deep sowing (*Vertiefen*) gave absolutely negative results, which is not surprising considering that the deep sowing compressed still further the heavy soil already inclined to form a crust;

4) Zehetmayer's modification, consisting in sowing in deep furrows, is easier to carry out, and favours the development of a shorter and stronger stalk; even this method did not, however, give the exceptional results expected from it.

Other general results of these experiments are.

1) Earthing up induces a higher production for each plant, which may possibly come to compensate for the loss entailed by the wider intervals. The essential factor of the Demtschinsky method is not the abundant stooling of each plant but a more intense nutrition. It is however doubtful that this factor can attain to such importance as to compensate for the difficulties and the cost of this method.

2) By the Demtschinsky method the period of vegetation is prolonged, thus favouring the development of rust. In fact, in the above experiments, the earthed-up plants shot into ear 3 or 4 days, later, although they matured at the same time, except the oats which were 2 days late, and in 1909 even 8 days late, with a strong attack of rust.

HOLL. **The Kozesnik Method of Tree Planting.** (Die Pflanzmethode nach Kozesnik). — *Oesterreichische Forst- und Jagd-Zeitung*, 29 J., N. 12, pp. 111-112. Wien, 24 März, 1911. **788**

Austria

The writer recalls the Kozesnik method for the planting of forest trees:

1) Prepare holes deeper than the longest roots;

2) Place the plants in such a way that the roots are spread out and the neck resting on the bottom of the hole;

3) In filling the holes, raise the plant, so that the neck comes to be level with the surface;

4) Press the plants into the soil with the palm of the hand, and ram the soil firmly over the roots;

5) Fill in the cavities thus formed with more soil well pressed down;

6) Cover up level with loose soil.

This method did not fulfil the expectations raised; and as it does not ensure the natural position of the roots, it does not justify the extra expense entailed in comparison with other methods. Possibly the procedures 2 and 3 may eventually form part of a new planting method.

789 G. PROMSY. **Influence of Acidity on Germination.** (De l'influence de l'acidité sur la germination). — *C. R. de l'Acad. des Sciences*, T. 152, N. 8, pp. 450-452. Paris, 20 février, 1911.

France Seeds were sown in Fontainebleau sand, and were either previously soaked for 24 or 48 hours in a determined solution of organic acid, or the sand was watered with the same solution. The experiments were made with seeds of pimento, tomato, *Dioscorea*, and *Elaeis guineensis* with citric, malic, oxalic, tartaric, and acetic acids in different proportions. It was shown that organic acids are among the substances that may contribute to the nutrition of plants.

There is an acceleration of germination, both as regards the dimensions and the weight of the seedlings, under the influence of organic acids. This influence varies according to the seed and for each kind of seed according to the acid used. In these conditions, the equally favourable action of certain basic substances, formerly ascertained, cannot be attributed to neutralisation of the acidity of the seedling.

790 F. FILTER. **Influence of Light on the Germination of the Seeds of Italian Rye-grass,** *Lolium italicum.* (Ueber einen Fall von Lichtkeimung bei italienischem Ryegrass). — *Illustrierte Landwirtschaftliche Zeitung*, 31 J., N. 22, pp. 205. Berlin, 18 März, 1911.

Germany Some samples of Italian rye-grass, of French origin, examined at the Experimental and Bacteriological Institute of the High School of Agriculture at Berlin, showed a difference in germinating power of 33.3 % in favour of germination in light instead of in the dark. English seed, without having a higher germination sprouted more rapidly, in light.

Consequently, contrary to the present regulations, account must be taken in future, of the action of light in determining the germinative power of Italian rye-grass.

A Method for Accelerating the Germination of French Beans and Increasing their Vigour. (Un medio para accelerar la germinación de la semilla de frijol y dar mayor vigor a las plantas nacidas). — *El Agricultor Mexicano,* p. 14. Ciudad Juàrez, Enero de 1911. **791**

Mexico

In the Division for Horticulture of the Central Agricultural Station, in Mexico, experiments have been made with a view to hastening the germination of French beans. The best results were obtained by the immersion of the seed in a solution of sulphate of iron at 1 % during 5 hours. Out of 100 seeds soaked in water, 92 germinated during 10 days; while of 100 seeds soaked in the above solution, 97 germinated. On the 6th day, 6 had germinated in water, and 11 in the solution.

Two plots were then sown, on the same soil, with 100 seeds each, the first with seed previously soaked in the solution for 5 hours; the second with seed soaked in water. Thirteen days later, 91 seeds had germinated in the first plot and 82 in the second; and after 3 days only, 75 plants had sprouted in the first plot and 35 in the second. Besides this, the plants in the first plot had double the development, and the yield was also double.

P. LESAGE. **On the Use of Potash Solutions for Detection of the Germinative Power of Certain Seeds.** (Sur l'emploi des solutions de potasse à la reconnaissance de la faculté germinative de certaines graines). — *C. R. de l'Acad. des Sciences,* N. 10, pp. 615-617. Paris, 6 mars, 1911. **792**

France

M. Lesage made experiments with seed of *Lepidium sativum* in 1888, 1889 and 1893, compared with seed of 1909 of good appearance and carefully chosen, and seed of 1909 sorted out intentionally as bad seed. He found that *Lepidium* seeds that have lost their germinative power color potassium hydrate solutions, and those likely to germinate do not colour them, under a certain concentration limit. As the time necessary for this coloration to appear is shorter than that required for germination, it may be advantageous to employ this method for the detection of the germinative faculty.

M. Lesage has applied this method only to the seed of *Lepidium sativum*,

793 R. W. THATCHER. **Adaptation of Crops to Soil and Climate.** — *The Dry Farming Congress Bulletin.* December 1, 1910, Vol. III, N. 23, pp. 539-543, Spokane, Wash.

United States: Washington

At the Washington Agricultural Experiment Station was investigated whether the exchange of seed from a region of light rainfall to one of heavier rainfall would have an effect upon the yield and quality of the crop.

A selected locality was at Quincy, where the rainfall is lower than in any of the agricultural districts of Eastern Washington; another at Ritzville, representing the medium supply of moisture; and a third at Pullman, where the rainfall is heavier than in any of the wheat growing districts of Eastern Washington. 10 strains of Bluestem wheat were selected and each of these was planted at each of the three stations. At the close of the first season the seed from each station were transferred to each of the others. The crop resulting from each of these strains was harvested and then grown for three successive seasons at each of the three stations, planting homegrown and transferred seed side by side in each instance.

In only one case was an improvement in yield or quality secured by the transfer of the seed.

Endeavouring to discover whether the variations found in wheat grown in different parts were due to differences in the composition of the soil or to differences in climatic conditions in the several localities, a considerable quantity of soil was transferred from Ritzville to Pullman and vice versa.

Upon each of the two soils at each of the two stations was grown wheat which had been grown previously at each of the two localities. This was repeated for three years in succession, and an analysis of the resulting crops in every instance shows that it was impossible to detect any difference in the composition of the wheats grown in the same locality upon the different types of soil, but that all the wheats grown in the same locality showed the characteristic composition of the grain of that locality.

Similar experiments have been conducted on a larger scale by the United States Department of Agriculture in co-operation with the experiment stations of Kansas and California.

The general conclusion from all these experiments is that the chemical composition of the soil has no relation to or effect upon the composition of the grain growing upon it, but that variations in composition of the grain are due almost wholly to different climatic conditions.

At the Washington Exp. Station were also made extensive investigations on the effect of different climatic factors upon the yield and quality of grain. The results which have thus far been obtained show that any climatic condition, which shortens the ripening period of the grain, decreases the size of the kernels, increases lightly the bushel weight, and increases the percentage of nitrogen or gluten content of the wheat. The shortened ripening period results in a decreased yield per acre. The problem of selection of grains adapted to a given climatic condition becomes then a matter of selecting those strains which will show the least injurious effect upon the yield with the greatest beneficial effect upon the quality of the grain from the climatic conditions during the harvest.

WACKER. **Influence of Winnowing of Seed on Quantity and Quality of Produce, in the Case of Oats.** (Beitrag zur Frage des Einflusses des Saatguts auf Menge und Güte der Ernteerträge). — *Fühling's Landwirtschaftliche Zeitung*, 60 J., H. 4, pp. 113-121. Stuttgart, Februar, 1911. **794**

Oat-seeds, of equal and known origin were prepared in different ways, with the following results as for quality: **ermany**

TREATMENT	Weight of 1000 seeds, grams		Weight of 1 hectol. kg	
	1908	1909	1908	1909
1. Winnowing machine (*Putzmühle*)	35.40	33.75	43.00	42.80
2. » and fanning machine (*Putzmühle u. Windfege*)	39.58	35.50	48.00	47.80
3. Winnowing, fanning and separator machine (*Putzmühle, Windfege u. Trieur*)	40.92	41.25	40.80	47.30
4. Winnowing and centrifugal machine (*Putzmühle u. Zentrifuge*)	41.35	36.25	48.00	47.70

The productiveness of the seeds, in equal conditions, was the following:

TREATMENT	Average yield per hectare Qls. 1908-1909	
	Grain	Straw
1. Winnowing machine (*Putzmühle*)	32.89	61.31
2. » and fanning machine (*Putzmühle u. Windfege*)	33.06	72.00
3. Winnowing, fanning and separator machine (*Putzmühle, Windfege u. Trieur*)	36.03	70.56
4. Winnowing and centrifugal machine (*Putzmühle u. Zentrifuge*)	35.25	71.04

The treatment of the oat seeds has therefore some influence on the quantity of the yield, but no definite relations can as yet be established.

795 T. R. Robinson. **Seed Sterilisation and its Effect upon Seed Inoculation.** — *U. S. Dept. Agr. Bureau of Plant Industry.* Circ. 67, p. 11.

United States The germination percentage of alfalfa, beans, wheat, maize and radish seed appeared higher after sterilization with 1 to 3 per cent of hydrogen peroxide than before, but was almost invariably decreased by the use of formaldehyde and mercuric chloride. Full strength commercial or 3 per cent, or 1 per cent hydrogen peroxide failed to sterilize garden peas or beans by means of 10 or 60 minute applications.

All other seeds tested were sterilised by either period of application of hydrogen peroxide except in case of a 1 per cent solution on radishes. Formaldehyde or 0.5 per cent mercuric chloride almost invariably sterilized, but 0.1 per cent mercuric chloride completely failed in case of peas and beans and in the shorter or 5 minute application to alfalfa and maize. Treatment with formaldehyde and mercuric chloride resulted in distorted sprouts when the seeds were germinated but affected hard-coated leguminous seeds less than the non leguminous seeds, most of which were killed.

The residual effects were tested by attempts to grow *Bacillus subtilis* in washings from the seeds after 2, 3 or 4 rinsings. Two rinsings failed to remove hydrogen peroxide but 3 were sufficient. Seeds treated in vacuum were more perfectly penetrated by the sterilizing agent, but this advantage was more than counterbalanced by the greater difficulty experienced in removing its toxic effects before inoculation. The writer concludes that careful seed disinfection should precede legume inoculation experiments and that metallic poisons such as mercuric chloride are objectionable because difficult or impossible to remove from the seeds. Sulphuric acid is more readily rinsed off than mercuric chloride, while hydrogen peroxide is still less harmful in its residual effect and is effective in eliminating bacterial contamination.

Field Crops. — Industrial Crops. — Horticulture. - Arboriculture.

796 E. BAILLAUD. **Exhibition of Wheats at the Marseilles Colonial Institute.** (L'Exposition des blés de l'Institut Colonial Marseillais). — *J. Agr. Tropicale*, N. 116, pp. 45-47. Paris, février, 1911.

France

This exhibition of the wheats of Algeria and Tunis has drawn attention to the fact that in different samples the same variety presents important differences, not only in purity (the presence of soft grains in hard wheats) but especially in the true characters of the grain, shape, colour, horny consistency etc.

In industrial experiments for the determination of the qualities of different wheats, the aim should be to have samples of grain of the same origin and as much as possible of the same appearance. It will be seen, by this appearance, whether it is possible to regard as identical wheats of the same variety, but from different countries and grown under different conditions; and a graduation scale might be established for grain of the same variety which would form different commercial types.

797 AUGUSTIN. **Experiments on Thin and Thick Sowing with Barley.** (Gerstenanbauversuche mit verschieden starker Aussaat). — *Illustrierte Landwirtschaftliche Zeitung*, 31 J., N. 9, p. 66. Berlin, 1 Februar, 1911.

Germany: Prussia

Ten experiments on closeness of sowing, made with *Hanna* barley in 10 different localities in Brandenburg, upon a surface of 0.75 hectare in each locality, divided in 6 plots, 3 for control and 3 for experiment. The experimental results are summarised in the table in the next page.

These results confirm those previously obtained by Professor Gerlach, and show that no general rules can be given for closeness of sowing, which must be determined in each case by each farmer according to his own experience of soil, climate, culture conditions, plant, quality of seed, manure, etc.

SOIL	Manure for 1/4 ha. Qls.					Yield for 1/4 ha. Qls.					
	Farm yard manure	Marl	Kainit	Thomas slag	Sodium nitrate	40 kg. seed		30 kg. seed		20 kg. seed	
						barley	straw	barley	straw	barley	straw
Clay loam	—	—	2.5	1 5	0 25 amm sulph.	8 53	9.36	8 61	9 05	9.05	8.18
Id. id.	—	6	1.5	1	0.2	5.98	6.11	6.77	6 59	6.91	7.02
Sandy loam	40	—	½ (40%)	1	—	5.92	5.15	6.43	4.68	5.90	3.99
Clay.	—	—	1	½ super.	0 125	6.89	4.23	7.19	4.02	5.97	3.44
Sandy loam	—	—	1.5	0 25 »	—	5.25	5.95	4.67	6.60	4.37	4.20
Id. id.	—	—	1.5	0 75 »	0.15	5.50	8.55	5.30	8.30	4.60	7.06
Clay loam.	40	—	—	—	—	5.57	6.42	5.30	6.22	4.75	5.58
Humiferous clay	—	—	—	½ amm. super.	—	5.10	5.99	4 26	5.10	3 69	5 90
Light clay.	—	—	1 5	1	0.15 amm. sulph	7.74	6 14	7 65	6.12	7.31	5 73
Clay loam.	—	—	2	2	0.25	5.18	4 70	4.66	3.76	4.22	3.43

798 K. Popovitz. **Thickness of Sowing in Maize.** (Ein Mais-Anbau-versuch). — (*Wiener Landwirtschaftliche Zeitung*, 61 J., N. 11, p. 109. Wien, 8 Februar, 1911.

Austria

Four plots each of 1400 m.^{2} - in equal manure and culture conditions. The variety of maize was the *Yellow horse-tooth*, sown April 15, 1910 and harvested September 20, 1910. The rainfall during the growth of the maize was 326 mm.

PER HECTARE	**Plot A** Interval between plants 63/63 cm.	**Plot B** Interval between plants 63/31.5 cm.	**Plot C** Interval between plant 66/71 cm	**Plot D** Interval between each 2 plants 66/71 cm.
No. of plants cultivated .	25 195	50 390	21 450	42 900
No. of plants harvested .	24 439	37 943	19 305	30 004
No. of plants harvested, per cent	97	75.3	90	70
Failures per cent	—	4	3	5
Damaged by hoeing, per cent	2	18	6	14
Destroyed by insects or pests, per cent	1	3	1	5
Ears harvested, Qls. . .	75.03	79.30	65.06	71.40
PER PLANT				
Ears harvested, kg . . .	0.307	0.209	0.377	0.210

The writer draws attention to the remarkable number of plants damaged by hoeing, on an average, 10 %. With seed in furrows, this average may reach 15 %, which may represent, at the rate of 30 qls. per hectare, a loss of 5.30 qls., equivalent in value to about a third of the cost of cultivation and harvesting.

799 R. O. Baird and C. K. Francis. **Chemical Composition and Industrial Value of Kafir Corn.** — *Jour. of Industrial and Engineering Chemistry*. Vol. 2. No. 12. pp. 531-534 Easton, Pa. Dec. 1910.

United States

The value of Kafir Corn (*Andropogon Sorghum vulgaris*) as a drought-resistant crop, and its superiority to maize in this respect has been clearly proved.

The following tables give the results of a number of analyses that have been averaged and calculated to a moisture-free basis.

I. COMPARISON OF MAIZ AND KAFIR CORN. MOISTURE-FREE BASIS.

	Maize		Kafir Corn	
	Max.	Min.	Max.	Min.
Ash	1.74	1.09	1.93	1.35
Protein	13.88	8.35	14.85	12.81
Fat	6.02	3.95	4.39	3.90
Carbohydrates	85.78	78.92	84.33	76.44

II. PLANT FOOD REMOVED FROM SOIL

	Kafir Corn	Maize
Average yield in bushels per acre	30.	35.
Pounds per bushel of potassium oxide	0.218	0.227
Pounds » acre » » »	6.540	7.945
Pounds per bushel of phosphoric pentoxide	0.345	0.366
Pounds » acre » » »	10.362	12.810
Pounds per bushel of nitrogen	1.089	1.023
Pounds » acre » »	32.940	35.798

III. PRODUCTION OF ALCOHOL.

	Kafir Corn	Maize
Pounds of fermentable material (starch and sugars) in one bushel	38.0	39.2
Approximate pounds of alcohol per bushel	18.0	19.0
Gallons of alcohol from one bushel	2.56	2.7
Cost of grain to produce one gallon of alcohol	12 cents or $5\frac{3}{4}$ d	14 cents or $6\frac{3}{4}$ d

The melting point of Kafir Corn fat is 44°.2 C., while that of Maize is 18° to 20° C. This shows that the former contains more of the solid fatty acids.

Kafir Corn fat would therefore be more satisfactory in soap manufacture than maize oil: and it might well be mixed with edible oils and fats, such as lard and butterine as it has a pleasant taste and smell.

To sum up:

a) Kafir Corn is more uniform than maize in composition.

b) It is a cheap food.

Alcohol and glucose can be produced cheaper from Kafir Corn than from maize, if the cost of the raw material is alone considered.

c) Kafir Corn removes a smaller quantity of the important plant foods from the soil than maize: - a fact proved by analyses of the ash of both grains grown under similar conditions.

800 CARLETON R. BALL. **The Importance and Improvement of the Grain Sorghums.** — *U. S. Department of Agriculture. Bureau of Plant Industry.* Bulletin N. 203. P. 45. January 20, 1911. Washington.

United States

Kansas and Oklahoma grow annually over 1 250 000 acres (505 750 hectares) of grain sorghums, including Milos, Durras, Kafirs and Kowliang. It is probable that an equal area is also grown in Texas. The grain sorghum acreage in Kansas is nearly 10 per cent of the maize acreage, and in Oklahoma over 12 per cent. More than half the Kafir and over 95 per cent of the Milo are grown on the dry lands, west of the ninety-eighth meridian. In this region the proportionate acreage of grain sorghums to maize is steadily increasing. The average acre value of the grain sorghums in Kansas is greater than that of maize.

The grain sorghums may be greatly improved through selection chiefly in the direction of (1) drought resistance, (2) earliness, (3) dwarf stature, (4) productiveness, (5) freedom from suckers and branches, and (6) erect heads.

Early plants take advantage of early seasonal rainfall and also have lower water requirements. Milos, White durra, and some Brown

Kowliangs are normally early. An early black strain of Black hull Kafir has been produced. Dwarf stature lowers the water requirement of the crop and permits heading by machinery.

Experiments show that under Panhandle climate and soil conditions Kowliangs give best yields with a stand of 1 stalk to each 5 or 6 inches (12 to 15 centimetres) of 3 ½ foot (106 centimetres) rows; Milos and Durras each 7 or 8 inches (18 or 20 centimetres), and Kafirs each 10 inches (25 centimetres).

801

BRANCHINI. **Japanese Rice in Italy.** (I risi dell'avvenire?) — *Il Villaggio*, N. 1809, p. 99. Milano, 25 Febbraio, 1911.

Italy: Lombardy

In the province of Pavia, in North Italy, several farmers have experimented, since 1908, under the direction of M.r Branchini, several varieties of rice imported directly from Japan. Among these, the varieties Tsuki Fu, Fu Ku Schima, Sckiyama, Jamato-Riki, and Shira Kawa showed the greatest resistance and precocity and gave the highest yields.

The cultivation in 1910, the third experimental year, shows that at least two of the above named varieties might advantageously replace in some cases the common varieties of Italian rice (1).

All the varieties were very early, being all ripe by September 20th. Some had a slight tendency to get laid. The ears contained, on an average, the following number of grains:

Fu ku Schima	220
Sckiyama	270
Jamato Riki	380

Their production in metric quintals per hectare was:

Fu ku Schima	59.18 Qls.
Sckiyama	61.19 »
Jamato Riki	62.26 »

It may be remarked that the season was bad, and the rice suffered from hail. The cultural conditions were neither very favourable.

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(1) It is not said, however, whether the Japanese varieties of rice have the same gloss and hardness which give so high a character to the Italian varieties. (See: MARRO, *Coltivazione delle piante erbacee*, 5ª Ed. p. 289. Roma, 1909). [*Ed.*].

802 PAUL AMMANN. **A Perennial Rice in Senegal.** (Sur l'existence d'un Riz vivace au Sénégal). — *Bulletin des Séances de la Société Nationale d'Agriculture de France*, T. LXX, N. 10, pp. 893-900. Dec. 1910. Paris.

Senegal In many parts of Africa rice is found growing wild. Schweinfurth found it in the Bahr-el-Gazal, Cameron between Lake Tanganyika and the west coast; Father Sébire on the banks of the Niger; Casimir Maistre in the marshes of the Upper Chari; Auguste Chevallier in the Upper Congo; Ammann near Niafounké. In the Richard-Toll region, in North Senegal, Mr. Ammann has discovered a rice that differs from all these in that it has rhizomes, and multiplies thus without depending on seed. This rice is considered so superior to other rice that at Saint Louis the natives exchange one calabash of it for three of imported rice. Analysis of the grain gives the following figures:

	Perennial Rice of Richard-Toll %	Wild Rice of Niafounké %	Cultivated Rice of Niafounké %
Water	13.81	12.24	12.10
Ash	0.58	0.80	0.70
Fatty matter	2.05	1.60	2.00
Albuminoids	5.80	7.74	6.24
Starch	70.50	69.80	70.20
Saccharifiable cellulose	4.50	4.00	4.80
Crude fibre	2.35	2.15	2.70
Not determined	0.41	1.67	1.26

The stalks of perennial rice, especially when green, constitute a forage of excellent quality, as the following analyses show:

	Air-Dry Stalks from Richard-Toll %		Green Stalks grown in the Colonial Garden %	
	moist	*dry*	*moist*	*dry*
Water	16.90	0.00	69.30	0.00
Ash	9.94	11.96	2.50	8.15
Fatty matter	0.72	0.87	0.39	1.28
Albuminoids	3.06	3.68	2.15	7.00
Saccharifiable matter . .	45.45	54.70	9.30	30.30
Crude fibre	21.55	25.96	10.44	34.02
Not determined	2.38	2.83	5.92	19.25

The perennial rice grows in the Richard-Toll region, in rather light soils, rich in potash and nitrogen but poor in phosphoric acid and lime. These soils contain also about 0.1 % of sodium chloride, so that this rice would probably grow in saline soils, and might be cultivated where the soil is too salt for other crops, or in those soils from which it is desirable to remove the salt in order to grow cotton, as in Egypt; or to grow other plants, as in the Camargue, in France.

CLAUSEN. **Potassium Salts in Buckwheat Culture.** (Ueber die zeitliche Anwendung der Kalisalze bei der Düngung des Buchweizens). — *Illustrierte Landwirtschaftliche Zeitung*, 31 of. N. 10. pp. 73-74 | 5 fig. Berlin, 4 Februar, 1911. **803**

Germany

Manuring experiments with buckwheat in sandy soil. The plots were of 3 ares each: 5 with complete manure, 2 without nitrogen, 2 without phosphoric acid, 2 without potash, 2 unmanured. Each plot manured with potash was divided into two equal parts, one treated with kainit, the other with potassium silicate:

	Average Total Results Yield · Qls. per Hectare	
	Grain.	*Straw.*
Complete manure (kainit)	25.02	32.91
Without potash	21.35	24.75
Increase of yield . . .	3.72	8.16
Complete manure (silicate)	25.07	32.23
Without potash	21.35	24.75
Increase of yield . . .	3.72	7.48
Kainit of preceding year	25.20	33.30
Without potash	21.35	24.75
Increase of yield . . .	3.85	8.55
Average results of use of kainit:		
In spring	12.08	22.65
In summer	23.58	33.80

The writer draws the conclusions:

a) The application of kainit in spring diminishes the yield by about half;

b) The application of kainit in summer does no harm but induces no increase of the crop;

c) On the other hand, the application of kainit to the preceding crop induces an increase of yield. The increases in yield above noted were due to this after-effect and to the potassium silicate.

804 J. F. Hoffmann. **Influence of Sodium Nitrate on Potatoes in 1909-1910.** (Kartoffel analysen der Ernten 1909 und 1910). — *Zeitschrift für Spiritus Industrie,* Jahrg. 1911, Ergänzungsheft, pp. 52, 61-64. Berlin, 1911.

Germany Five experimental fields were cultivated each with 5 varieties of potato, in soil heavily manured with farmyard manure and 2 quintals of superphosphate per hectare; the half of each plot was treated with sodium nitrate at the rate of 6 quintals per hectare.

The soils were: sandy clay; clayey sand; sandy alluvial soil; the varieties cultivated were: *Agraria, Erste von Nassenheide, Ordon, Wohltmann v. L.* 34, *Dabersche,* in one field *Bohms Erfolg* was substituted for *Wohltmann v. L.* 34. Analysis showed that:

1) As was to be expected, the potatoes manured with sodium nitrate had a higher percentage of albuminoids; the difference oscillated between 1 and 2 %.

2) The starch content of the potatoes manured with sodium nitrate was lower, but with slighter differences than for the albuminoids.

3) Among the potatoes manured with nitrate there were greater differences in starch content than among those not manured, so that they would not keep so well.

4) Potatoes manured with nitrate are generally larger.

805 W. Œtken. **Potato Varieties.** — (Berichte über die im Jahre 1910 durch F. Heine zu Kloster Hadmersleben ausgeführte Versuche zur Prüfung des Anbauwertes verchiedener Kartoffelsorten). — *Zeitschrift für Spiritusindustrie,* Jahrg. 1911, Ergänzungsheft

pp, 65-75. Berlin, 1911; (Die Ergebnisse der Heineschen Kartoffelanbauversuche zu Kloser-Hadmersleben im Jahre 1911). — *Illustrirte Landwirtschaftliche Zeitung* 31 J. N. 14, pp. 113-115. Berlin, 18 Februar, 1911.

German Pcussia

M. Œtken gives the average results of the last three years of experimentation, *i. e.* the 32nd 33rd, and 34th years of the series of culture experiments with potatoes begun by F. Heine at Kloster-Hadmersleben (Prussian Saxony).

The writer distinguishes

1) Table varieties, o good shape and excellent cooking qualities, of which the yield and the starch content are of secondary importance:

2) Common varieties with high yields, sufficient starch content for industrial purposes, and having fair appearance and cooking qualities;

3) Industrial varieties yielding well both for crops and starch;

4) Farm varieties, scarcely fit for table, with a lower starch content than 2 and 3, having a very high yield and high content of nutritive substances, giving great forage crops;

5) Forage varieties, with. high yield, unfit for table, with low starch content. Nos. 2, 3 and 4 often give good results as forage crops.

Yield averages for 1908-1910:

Order of Yield	VARIETIES	GROWER	[illegible]	Starch o/o	Starch per hectare Ql	[illegible]
1	Gross-Bieberauer Ertragreichste	Böhm, Gross-Bieberau	350.6	15.3	[illegible]	[illegible]
2	Vater Rhein	Id.	326.7	17.1	[illegible]	10
3	Switez	Dolkowski, Nowawes	321.8	19.9	64.09	[illegible]
4	Jubelkartoffel	Richter, Hameln	321.1	18.3	58.92	[illegible]
5	Industrie	Modrow, Gwizdyn	318.9	16.7	[illegible]	[illegible]
6	Böhms Erfolg	Böhm, Gross-Bieberau	316.2	20.1	[illegible]	3
7	Prof. Wohltmann	Cimbal, Fromsdorf	311.1	20.7	[illegible]	1
8	Aza	Dolkowski, Nowawes	312.8	18.0	[illegible]	[illegible]
9	Lucya	Id.	306.2	19.0	60.19	[illegible]
10	Hassia	Böhm, Gross-Bieberau	305.3	16.5	[illegible]	[illegible]
11	Bohun	Dolkowski, Nowawes	299.2	19.0	60.19	[illegible]
12	Alma	Cimbal, Frömsdorf	291.3	18.2	[illegible]	17
13	Konkurrent	Veenhuizen	290.6	19.1	[illegible]	11
14	Lucia	Paulsen, Nassengrund	287.6	17.1	[illegible]	[illegible]
15	Imperator	Richter, Hameln	281.0	17.6	49.90	[illegible]
16	Staseye	Dolkowski, Nowawes	280.9	17.7	48.69	[illegible]
17	Bojar	Id.	279.7	18.1	[illegible]	[illegible]
18	Eckenbrechers 578/02	Cimbal, Frömsdorf	271.7	19.8	[illegible]	11
19	Blaue Riesen	Paulsen, Nassengrund	273.5	16.1	[illegible]	[illegible]
20	Sass	Dolkowski, Nowawes	271.6	18.1	49.16	28
21	Agraria	Paulsen, Nassengrund	270.4	21.6	58.32	[illegible]
22	Ordon	Dolkowski, Nowawes	267.9	20.8	[illegible]	16
23	Gehr. Haas	Böhm, Gross-Bieberau	265.1	19.5	51.64	19
24	Vor der Front	Richter, Hameln	265.3	19.1	51.47	20
25	Ella	Cimbal, Frömsdorf	264.1	17.7	48.18	[illegible]
26	Schnellerts	Böhm, Gross-Bieberau	263.1	18.8	49.51	[illegible]
27	Brocken	Breustedt, Schladen	262.5	20.5	54.16	[illegible]
28	Fürstenkrone	Richter, Hameln	262.0	18.3	48.11	[illegible]
29	Harzer Riesen	Breustedt, Schladen	261.9	19.0	49.70	[illegible]
30	Schladener Ruhm	Id.	260.2	21.7	56.69	[illegible]
31	Bravo	Veenhuizen	258.0	21.5	[illegible]	13
32	Starkenburger Frühe	Böhm, Gross-Bieberau	252.0	17.1	[illegible]	[illegible]
33	Kupferhaut	Cimbal, Frömsdorf	250.2	16.8	42.33	[illegible]
34	Eigenheimer	Veenhuizen	248.7	17.5	43.60	[illegible]
35	Royal Kidney	Findley, Markirch	246.2	15.1	37.27	40
36	Bund der Landwirte	Paulsen, Nassengrund	237.0	20.9	49.29	27
37	Präsident Ascher	Arnsb	236.5	17.5	43.60	[illegible]
38	Johanna	Richter, Hameln	233.5	20.7	43.53	30
39	Rodensteiner	Böhm, Gross-Bieberau	231.4	16.9	39.22	39
40	Modell	Veenhuizen	223.6	18.6	41.60	38
41	Mülhäuser	—	219.5	15.9	[illegible]	[illegible]
42	Zwickauer Nieren	Richter, Hameln	203.2	18.5	37.58	[illegible]
43	Paulsens	Paulsen, Nassengrund	197.1	15.9	31.22	[illegible]
44	Dabersche	—	192.5	19.8	38.21	[illegible]
45	Gehr. Tiel	Richter, Hameln	191.6	17.0	32.55	[illegible]
46	Hochländer	—	191.1	16.2	31.02	46

Of these varieties, those really fit for table are: *Mülhäuser* and *Paulsens Juli* early, with yellow flesh; *Konkurrent*, half-early, yellow; *Bravo*, yellow; *Präsident Ascher*, half-late, yellow; *Industrie*, late, yellow; *Royal Kidney*, early, white flesh; *Ella, Lucia, Alma,* and *Kupferhaut*, half-early, white; *Fürstenkrone* and *Johanna*, half-late, white.

GERLACH. **Cultivation and Manuring Experiments with Potatoes.** (Versuche über Anbau und Düngung der Kartoffeln im Osten). — *Illustrierte Landwirtschaftliche Zeitung*, J. 31, N. 15, pp. 126-127. Berlin, 22 Februar 1911. **806**

Germany: Prussia

It is a general belief among farmers, that potatoes, especially new varieties, readily degenerate in a few years. The following experiments, extending over 4 years, with the same varieties, on the same soil and with the same manure and treatment, show that this is not the case. The experiments were made on the experimental farm at Pentkowo, annexed to the Agricultural Institute of Bromberg, part with the original seed and part with seed grown on the farm:

Average of 4 years, per hectare.

Varieties	Original Yield *Qls.*	 Starch %	Local Yield *Qls.*	 Starch %
Vor der Front . . .	240	19.4	271	19.0
Brocken	264	19.8	286	20.1
Silesia	288	20.2	308	19.6
Bohun	289	19.7	311	19.4
Teodora	299	16.9	309	17.3
Sass	296	18.9	309	19.3
Bellome	309	16.4	326	16.9
Weisse Königin. . .	322	18.0	316	18.2
Average . .	288	18.6	305	18.7

Mr. Gerlach then gives the results obtained by Baessler in Pomerania, experimenting on the influence of size in seed potatoes:

	Yield per ha. Qls.	Starch %
Large potatoes (150 to 200 gr.)	377	15.0
Average potatoes (120 to 150 gr) . .	303	15.7
Small potatoes (50 to 80 gr)	255	15.5
Potatoes cut fresh	205	15.5
» cut shrivelled	230	15.0

These experiments would show that it is bad economy to use small or shrivelled potatoes for seed, and that there is a distinct advantage in sowing large potatoes with those of average size.

In the two experimental farms of Pentkowo and Mocheln, belonging to the Bromberg Institute, experiments in manuring potatoes have been carried out on a large scale for some years.

Nitrogenous mineral fertilisers do not seem to be required by potatoes until the second year of culture; with manure containing an average of 40 kg. of nitrogen, in the form of ammonium sulphate or in part, of sodium nitrate, the yield increases by 17 qls. per hectare.

Potatoes require very little phosphoric acid, also unnecessary until the second year: 3 to 4 qls. of Thomas slag or 2 to 3 qls. of superphosphate per hectare,

On the other hand, potatoes require plenty of potash with a treatment of 50 to 70 kg. of potash and farm yard manure, or of 70 to 80 kg. the second year, there is an increase of yield, respectively, of 15 to 56 qls. and of 44 to 62 qls. per hectare; on light, porous soils kainit may be freely used, but on rich soils it is better to use potassium salts, as they do not induce a decrease in the percentage of starch as is sometimes the case with kainit.

807 C. V. Eckenbrecher. **Potato-Culture at the German Potato-Culture Station in 1910.** (Bericht über die Anbauversuche der Deutschen Kartoffel-Kultur-Station im Jahre 1910). *Zeitschrift für Spiritusindustrie*, J. 1911, Ergänzungsheft. pp. 3-60. Berlin, 1911, and *Illustrierte Landwirtschaftliche Zeitung*, J. 31, N. 15, pp. 130-134. Berlin, 22 Feb. 1911.

Germany The German Potato-Culture Station has made researches on the culture value of 20 varieties of potatoes, on 27 experiment fields in different parts of Germany; 13 fields planted with 15 varieties gave the following comparative results in the last two years:

Experiment Fields	Yield per ha. Qls.		Difference	o/o Starch.		Diff.
	1910	1909	1910	1910	1909	1910
1. Gross-Saalau, sandy clay	291.1	309.3	— 18.2	16.8	17.4	— 0.6
2. Neudorf, sandy clay	325.4	271.4	+ 54.0	19.4	19.7	— 0.3
3. Althöfchen »	335.7	288.3	+ 47.0	17.2	18.8	— 1.6
4. Marienfelde, clayey sand	225.4	257.8	— 32.4	18.0	16.8	+ 1.2
5. Löhme, clayey sand	238.2	245.2	— 7.0	15.7	16.2	— 0.5
6. Greisitz, alluvial sand	243.8	317.4	+ 26.5	15.5	18.3	— 2.9
7. Mittlau sandy clay	203.0	241.6	— 38.6	17.6	18.5	— 0.8
8. Gröbzig, deep clay	262.6	298.7	— 36.1	18.3	20.4	— 2.1
9. Siegersleben, sandy clay	279.8	269.2	+ 10.6	17.8	20.3	— 2.5
10. Kloster Hadmersleben deep humous clay	258.2	274.3	— 16.1	18.9	21.1	— 2.2
11. Calvörde sandy clay	274.3	257.5	+ 16.8	15.5	16.3	— 0.2
12. Erbesbüdesheim, strong clay	290.8	331.4	— 40.6	16.1	17.2	+ 0.9
13. Gieshügel, deep clay	214.7	251.6	— 37.9	18.7	18.6	+ 0.1
Average	265.6	278.1	— 12.5	17.5	18.4	— 0.9

Varieties	Yield per hectare, Qls.			Starch. o/o		
	1910	1909	1910	1910	1909	1910
1. Dabersche	170.6	210.2	48.6	17.3	18.6	— 1.3
2. Richters Imperator	237.5	308.4	70.9	16.0	17.5	— 1.5
3. Agraria	250.2	255.1	— 5.9	19.8	17.9	— 0.1
4. Fürstenkrone	246.8	268.3	— 21.5	15.1	16.5	— 1.4
5. Wohltmann v. L. 34	290.6	314.0	— 14.4	19.6	19.8	— 0.2
6. Prof. Wohltmann	295.9	280.7	+ 8.2	19.0	19.5	— 0.5
7. Hassia	306.9	297.8	+ 10.1	15.2	15.6	— 1.4
8. Vater Rhein	315.7	303.4	+ 12.3	15.6	17.1	— 1.4
9. Böhms Erfolg	307.0	322.0	— 15.0	18.6	19.0	— 0.4
10. Judex	261.8	259.8	+ 2.0	18.4	19.1	— 0.7
11. Johanna	214.6	248.7	— 34.1	18.0	18.9	0.9
12. General Nodzu	229.5	232.0	— 2.5	19.0	19.9	— 0.9
13. Lucya	283.8	281.1	+ 2.7	17.5	18.3	— 1.3
14. Geheimrat Haas	294.2	288.1	+ 6.1	17.1	18.2	— 1.1
15. Schwellerts	272.7	288.2	— 15.5	17.3	17.9	— 0.6
Average	265.8	278.2	— 12.4	17.5	18.4	— 0.9

The total results of 1910 gave an average of 17.4 % of starch content, or a decrease of 1.1 % on that of 1909. In 1910, the varieties richest in starch were *Schladener Ruhm* with 29.4 %, *Agraria* with 19.3 %, *Wohltmann v. L.* 34 with 19.2 %. The average yield of starch per hectare was 49 qls. in 1909; in 1910 only 3 varieties reached this average. The *Wohltmann v. L.* 34 gave the highest yield of starch in 1910, or 54.6 qls. per hectare.

808 PAUL PIPERS. **Influence of Sodium Nitrate on Starch Content of Potatoes.** (La teneur en fécule de Pommes de terre sous l'influence d'une fumure au nitrate de soude). — *Contributions à l'étude des engrais chimiques*, publiées par J. Aeby, 4 livr., p. 27. Anvers, Mars, 1911.

Belgium. Holland

Numerous experiments carried out during several years show good results in potato culture from the use of sodium nitrate, as may be seen by the following table:

		Yield kg.	Average increase per 100 kg. of nitrate kg.
	Experiments, in Belgium in 1901:		
43	Experiments application of 200 kg. of nitrate	2830	1415
45	„ „ of 400 „ „	6870	1717
	Experiments in Holland in 1902:		
15	Experiments application of 200 kg. of nitrate	2823	1411
13	„ „ of 400 „ „	3159	780
	Experiments in Belgium in 1903:		
54	Experiments, application of 400 kg. of nitrate	7580	1895
	Experiments in Holland in 1903:		
30	Experiments, application of 400 kg, of nitrate	6040	1510
	Experiments in Belgium in 1905:		
64	Experiments, application of 400 kg. of nitrate	4920	1230

These 264 experiments, carried out under the most diverse conditions of culture, climate, soil etc., show an average increase of 1423 kg. of potatoes per 100 kg. of sodium nitrate. Putting the value of the nitrate at 24 fr. and that of 100 kg. of potatoes at 5 fr., the gain per hectare is of 47.15 fr.

The highest increase of yield resulting from three successive treatments with nitrate was not enough to pay for the extra labour entailed. Many farmers believe that sodium nitrate spoils the quality of potatoes, but Dietrich and König have shown that this is a mistake.

SMITH (Brit. Cons.) **Potatoes for Distillation of Alcohol in Russia.** · *The Board of Trade Journal.* N. 727. p. 101, London, Jan. 12, 1911. **809**

Russian

The use of potatoes in the distilling of alcohol in Russia becomes annually more important, great quantities being grown especially for this purpose. In 1910 the crop for the whole of European Russia greatly exceeded that of the previous year. The quality in most parts was better than in 1909. The proportion of starch varied from 11 per cent to just over 22 per cent. The climate of Russia is generally thought to be favourable for the production of good potatoes and it is suggested that their cultivation might be largely developed by the use of artificial fertilisers.

JULIO STORNI (fils). **Culture Experiments with Leguminous Forage Crops at Tucuman.** (Observaciones sobre el cultivo de diez leguminosas forrajeras en Tucuman). — *Gaceta rural,* Año IV, N. 42, pp. 443-445. Buenos-Aires, Enero, 1911. **810**

Argentine: Tucuman

In the northern part of Argentina, beyond lucerne, barley and oats, few forage plants have been introduced. The writer undertook to try the adaptability and yielding capacity of 10 other leguminous plants.

The soil under experiment was sandy clay, low, and well watered and the cultivation was carefully carried out. The seeds were sown on August 15, and the crops cut on November 25, with the following results:

	Yield Qls. per Ha.	Height of Plant, cm
Lupinus albus	220	under 50
Lupinus varius.	200	„ 80
Lupinus luteus.	180	„ 50
Lathyrus	180	„ 12
Vicia sativa	78	„ 15
Vicia villosa	100	„ 15
Ervum lens	150	„ 15
Medicago lupulina	not cut	„ 8
Vicia Narbonensis	120	„ 40
Vicia Faba	100	„ 40

The lupins did very well and resisted the excessive damp and other drawbacks; the beans, lentils and *Lathyrus* also did well; *Medicago lupulina* grows more slowly, but seems to adapt itself very well to the soil and climate; the vetches, on the contrary, were feeble, grew with difficulty and showed little resistance to the great heat.

811 ALEXIS YERMOLOFF. **The Lucerne of Turkestan.** (A propos de la Luzerne du Turkestan). — *Journal d'Agriculture pratique*, année 75, N. 8, p. 239. Paris, 23 février, 1911.

Russian Empire: Turkestan

Mr. Yermoloff replies to an article by M. Denaiffe on the lucerne of Turkestan (1):

" The conclusions of M. Denaiffe are not in favour of this plant, which did not yield with him the 6000 to 7000 kg. of forage which it produces in its native country; but he forgets to say that these results are obtained in Turkestan on irrigated land, and where irrigation is repeated after each mowing. The crop is mown from 5 to 7 times in the year, as I have myself observed while travelling in the country. The plant is never cultivated on dry and unirrigated land. In other conditions the plant offers no advantage over French lucerne, which is cultivated on a large scale in Southern Russia ,,.

812 E. DE CILLIS. **Berseem, or Alexandria Clover** (2). (Una nuova foraggera per i paesi caldi). — *La Rivista Agraria*, anno XXI, N. 4-6, pp. 45-72. Napoli, 29 gennaio-12 febbraio, 1911.

Italy: Sicily, Apulia

Berseem (*Trifolium alexandrinum* Linn.). was introduced into Italy in 1907 and was tried by several farmers, in Sicily, in Tuscany, in Apulia and in the Abruzzi, giving always good results when it escaped winter frosts.

In Sicily berseem was grown by Professor De Cillis, at Valdisavoia, near Catania, and by Professor Tucci, at Palermo, and it is now included in local cultures. The experiments of De Cillis showed that the best time for sowing in Sicily is towards the end of October. Phosphatic fertilisers had the most effect on the berseem, and next to them, potassic manures; gypsum had little effect, and ammonium sulphate none at all. The soil used for the experiments was fairly rich. The best results were obtained with the formula: 5 Qls. superphosphate; 5 Qls. gypsum; 1.5 Qls. potassium sulphate. This manure gave 559.14 Qls. of green forage per ha. in 2 cuttings, and 3.7 Qls. of seed with the second growth. Prof. De Cillis also remarked that it is well not to wait for the flowering before cutting the berseem; it must be cut when the plant has become sufficiently thick. In eastern Sicily he considers it better to mow twice and keep the second growth for seed, than to mow three times and keep the third growth for seed.

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(1) See this Bulletin No. 445, Feb. 1911. [*Ed.*].

(2) See this Bulletin November 1910, pag. 61. [*Ed.*].

In Apulia, berseem succeeds well if sown soon enough to enable it to resist frost; so too at Lecce, Galatina and Ugento; at Ugento the January cutting amounted to 96 Qls. green forage per hectare. At Andria, in the province of Bari, the April cutting was of 184 Qls. of green forage, equivalent to 28 Qls. of hay.

Prof. Vallese obtained, in the province of Lecce, from 3 to 6 cuttings a year, besides the seed, and from 400 to 453 Qls. of green forage per ha. He observed that in the province of Lecce berseem has two periods of development separated by a rest-period coinciding with the period of lowest temperature. The first period is from sowing until December, the second begins in February; in December and January vegetation is checked or slackens. By early sowing 2 cuttings may be obtained before the cold sets in; late sowings yield only one. Berseen is remarkably free from vegetable parasites, but Prof. Tucci, at Palermo, found it very subject to snails.

The great defect of berseem is its feeble resistance to frosts. Prof. De Cillis has begun experiments with a view to obtaining a frost-resisting variety by selection.

C. H. POJIDAEV. **Clover in the Brailov Territory.** (Ocerki polevekh kultur v Brailovskom Imienii-Kultura klevera). — *Khosiaistvo* (*The Home*), Gd VI, N. 1, pp. 5-12. Kiev, 6 Janvar, 1911. **813**

Russia: Podolia

The springing up of new industries — alcohol and sugar manufacture — in the Brailov territory, in Podolia, and the necessity of producing the raw material, sugar beets and potatoes, on the spot, have gradually brought more land under cultivation and left less under wood and pasture. In order to feed the growing numbers of cattle required to till the fields, forage crops have entered into the rotations. The best of these is red clover, which yields two or three cuttings in a year. The year after sowing, the first cutting is used for hay, the second for seed. The third year it is only cut once, or left as pasture during all the spring and ploughed up at the end of June.

There are two rotation systems in use:

1. *a*) Fallow, manured with farm-yard manure; *b*) winter cereals; *c*) sugar beets; *d*) wheat with clover; *e*) clover of the 2nd year.

2. *a*) Fallow, as above; *b*) sugar beets; *c*) winter wheat with clover; *d*) clover.

The results of these two systems are not always the same.

Manuring experiments with Thomas slag and gypsum have been tried without much success, probably because the spring in this region is generally very dry, and fertilisers spread on the surface cannot come into contact with the roots; the falling of the summer rains corresponds with the cutting of the clover, so that the action of the manures is only felt during the second half of the year. Thomas slag has then a very marked effect, increasing the yield and hastening the ripening of the seed. As the following table shows, the yield is greatly influenced by rainfall:

Rainfall in mm.		Year	Yield in *pud* and Kg.			
Annual	April-June		Hay		Seed	
			pud.	Kg.	*pud.*	Kg.
536.4	332.3	1902	150	2457	4.0	65.52
387.8	314.9	1903	141	2363	4.82	78.95
—	255.9	1901	100	1638	4.55	74.52
494.1	199.5	1905	115	1883	5.3	86.81
458.7	145.2	1904	106	1736	3.1	50.78

The higher the annual and the periodic rainfall, the more abundant is the hay crop. Drought and excessive damp are equally harmful to the crop of seed.

The Brailov territory lies between the forest zone, with fine and frequent rains, and the steppes with their arid climate. In years when the climate of the steppes predominates, there are frequent downpours of rain, irregularly distributed, the influence of which is seen in poor crops in some localities and abundant crops in others, sometimes reaching 160 *pud* of hay and 14 *pud* of seed.

BERSCH. **Improvement of " Sour " Meadows in the Alpine Regions of Austria.** (Moorkultur und Viehaufzucht). — *Wiener Landwirtschaftliche Zeitung*, J. 61, N. 11, pp. 107-108. Wien, 8 Februar. 1911. 814

Austri

The writer urges the necessity of greater forage production. In Alpine regions, besides the moors, there are in the valleys, vast extents of surface which, under proper treatment, might be cultivated with forage crops. This land constitutes what are called " sour meadows ", formed chiefly of mosses and acid plants and yielding scanty crops of bad hay. All this land might be reclaimed, at the following estimated cost per hectare:

Draining	fr.	472
Less 40 % State and provincial aid	„	188
	fr.	284
Seed and labour	„	126
Manure for first year: 7 Qls. Thomas slag, 4 Qls. potassium salts at 40 %	„	109
Total cost of amelioration	fr.	519
First year's crop of sweet hay, at 5.25 fr. the Ql., 25 Qls.	„	131
Remainder of cost at end of first year	fr.	388
Manure for second year: 1 Ql. Thomas slag, 1.5 Qls. potassium salts at 40 %	„	27
Total cost fr.	fr.	415
Second years crop: 70 Qls. sweet hay	„	367
Remainder of cost at end of second year	fr.	48
Manure for third year: 2.5 Qls. Thomas slag, 3 Qls. potassium salts	„	58
Total cost	fr.	106
Third years crop: 70 Qls. sweet hay	„	367
Profit	fr.	261

Even without the special subvention, there would be a profit of 73 francs at the end of the third year. The profits would be still larger if the produce were utilised on the spot.

815 F. TANGL and S. WEISER. **Alterations and Loss in the Nutritive Value of Forage by Acid Fermentation.** (Untersuchungen über die Veränderungen des Nahrwertes des Frutters beim Einsauer und über die dabei Auftretenden Verluste an Nährstoffen). — *Die landwirtschaftlichen Versuchs-Stationen*, Bd. LXXIV, H. III-V, pp. 263-342. Berlin, 13 Februar, 1911.

Hungary These experiments were made at Buda-Pest; the following data are particularly interesting The ensilage of lucerne produced considerable loss of digestible matter, probably due chiefly to fermentations and in part to the loss of juices by leakage. The silos were dug ont in the soil, without masonry. The following table gives the analysis of these losses:

Digestible nutritive matter	Quantity ensilaged kgs.	Quantity taken out of pit kgs.	Losses (–) or Increase (+) kg	 %
Dry matter	10 372	4 693	– 5 679	– 54.8
Organic matter	9 860	4 409	– 5 451	55.3
Raw Protein	2 205	967	– 1 238	56.1
Protein	1 758	408	1 350	76.8
Starches	447	559	+ 112	+ 25.1
Fatty matter	364	141	223	61.2
Raw Cellulose	1 770	748	1 022	57.7
Non-nitrogenous extractives	5 529	2 553	2 976	53.8
Utilisable chemical energy:				
Calories	35.8×10^6	15.8×10^6	-20.0×10^6	55.8
Starch values: kgs.	7 200	2 810	4 390	– 61.0

The writers recognise that the losses would have been much less if a silo lined with masonry or cement had been used instead of the simple excavation in the earth in which the experiments were made.

With leaves and tops of sugar beets there were the following losses:

Digestible nutritive Matter	In the green forage kgs.	In the fermented forage kgs.	Loss kgs.	%
Organic matter.	4 313.8	1 862.8	2 451.4	56.8
Raw Protein.	751.9	307.0	444.9	59.2
Protein	430.7	194.8	235.9	54.8
Fatty matter	33.4	0	33.4	100.0
Raw Cellulose	533.3	331.0	222.3	40.2
Non-nitrogenous extractives	2 975.2	1 224.4	1 750.8	58.8
Starch value.	3 355.3	1 582.2	1 773.1	52.8

In both cases there was an increase of non-digestible matter, but of different kinds for the two forages ensilaged, being much higher for the sugar beet silage. This fact is a fresh proof of the difference in fermentation for different forages.

Experiments with maize ensilage confirmed the common agricultural experience, that maize is aspecially adapted for ensilage. The following table gives the composition of maize forage before and after ensilage:

	Dry maize stalks		Maize stalks ensilaged	
	Air-dried %	Dried %	Adried %	Fresh %
Dry matter	85.00	100.00	100.00	35.00
Organic matter.	78.76	92.66	91.99	32.00
Ash	6.24	7.34	8.01	2.80
Raw Protein.	5.57	6.55	7.14	2.51
Protein	4.80	5.75	4.24	1.48
Fatty matter.	1.41	1.66	2.70	0.95
Raw Cellulose	27.53	32.39	33.26	11.64
Non-nitrogenous extractives	44.25	52.06	48.86	17.10

The influence of fermentation is plainly revealed ly the decrease in non nitrogenous extractive matters. In comparison with dry maize stalks they have diminished by 3.2 %. On the other hand ensilage shows an increase in the percentage of raw protein, of fats and of ash. There was a decrease only in protein. which lost 1.15 % due to the organisms which accompany fermentation.

The total nutritive value is diminished only to a very limited extent whilst the organic qualities of the forage are greatly improved, thus whilst the dry and tasteless maize stalks are not much relished ly cattle who waste a good deal of them, the same forage when ensilaged is greedily devoured.

Besides, maize stalks can not be properly dried except when the autumn is very dry, which rarely happens. On the contrary the usual persistent autumn rains damage this forage considerably.

816 **Ensilage in Victoria, in 1910.** (La situation de l'ensilage en Victoria en 1910). — *Bulletin de l'Office du Gouvernement Général de l'Algérie,* N. 4, p. 54. Paris, 15 févr. 1911.

Australia: Victoria

Most of the silos in Australia are now built with wood and iron. The only drawback to this type is that galvanised iron is apt to rust; the interior is white-washed in order to prevent this. The following table shows the number of farmers, from 1906 to 1910, who made use of silos, and the number of tons of ensilage produced:

YEAR	Number of Farmers	Ensilage tons.
1906	160	7 240
1907	210	10 580
1908	203	11 030
1909	392	18 205
1910	590	27 000

The progress here shown is due to the action of the Government which undertook the construction of silos for the farmers, on a system of gradual re-payment. The prosperity of Australia is absolutely dependent on her wealth in cattle; the ensilage question is therefore all-important for the country.

In the United States and in Canada one farmer in five has a silo; the Australian Government aims at establishing this proportion in Australia, not only in Victoria, but in the other States of the Commonwealth.

817 A. Esnault-Pelterie. **Work of the French Colonial Cotton Association.** (Les Travaux de l'Association Cotonnière Coloniale Française). — *Journ. d'Agr. tropicale,* No. 116, pp. 36-40. Paris, février, 1911.

From experiments undertaken by the Administration of the French Colonial Cotton Association, it appears that little is to be

Frenc
Colonie
Dahom
Madagasc
New
Caledon
etc.

expected from the acclimatisation of foreign seed cultivated by the natives in Dahomey. The cotton indigenous to Dahomey, on the contrary, seems likely to give good results under cultivation by the natives, especially where irrigation is introduced, along the Senegal and the Niger.

Cotton growing is developing in Madagascar, in Guadeloupe, in New Caledonia, in the Leeward Isles, and the Somali coast, the results being everywhere considerable compared with the limited resources of the Association.

The personal initiative of M. G. Dufetre has shown that, not withstanding a belief to the contrary, cotton culture is likely to be very remunerative in Algeria. Exhaustive information on the cultivation of cotton in Algeria is to be found in a work by M. Brunell.

818

HOWARD REED. **Geographical Aspects of the Problem of British Empire Cotton - Growing.** — *The Geographical Journal*, V. XXXVII, N. 2, pp. 120-140, London, February, 1911.

British Colonies

It is fully proved that cotton can be grown within the British Empire on a large scale and on a commercial basis. Four districts were specially selected by the British Cotton Growing Association for demonstration: Nigeria, Uganda, Nyasaland and the West Indies. The reports of the progress of cotton cultivation in the West Indies are very encouraging. The cotton grown is mainly that known as «Sea-island» which has been reintroduced from the islands of the coast of South Carolina. But other varieties are also being cultivated to advantage. Africa, however, affords the most promising field for the cultivation of the variety of cotton most in demand in Great Britain.

This especially applies to West-Africa, where there are large areas of land possessing a soil and climate specially suited for the purpose, where, indeed, an extensive native industry has been carried on for centuries. In Nyasaland the first experiments were made in 1901-02. By August of last year the cultivation was said to be «going ahead by leaps and bounds». Uganda also is proving a most promising field. Some difficulties were met with at first, due to the ignorance and inexperience of the natives, but, under careful instruction, these have been overcome, and now Uganda may become one of the greatest cotton-fields in the Empire. But these are not the only British lands where cotton can be profitably grown, and where efforts for its cultivation are being made. In South Africa, and particulary Rhodesia, good samples are being grown, and, in the latter country, special attention is being given to the subject by the British South Africa Company and the Cotton Association.

India and Ceylon, which, at present produce large quantities of short-fibred native cotton, can grow better qualities, and, by Governmental assistance and instruction, efforts to this end are being made, which are likely to result in a large increase of the supplies available from these countries. Australia, also, and New Guinea can grow cotton of good quality, while Borneo, Fiji, the Straits Settlements, the Malay States, the Seychelles, Mauritius, Cyprus, the Maltese Islands, and St-Helena, may all become producers. And all are needed, if the requirements of the British trade are to be met within the Empire. To keep pace with the present British demand, three and a quarter million bales of raw cotton, each of 500. lbs weight, are wanted every year. To meet this demand, the continued efforts of the British Cotton Growing Association and the various colonial governments, during eight years have only succeeded in producing one hundred thousand bales of 400 lbs. each or one thirty fourth of the yearly requirements of the Lancashire mills.

819 **Cotton Cultivation in India.** *The Indian Agriculturist.* Calcutta. Jan. 2, 1911, p. 29.

British India

The enormous increase in the importation of Egyptian cotton into the United Kingdom should induce a spirit of emulation among cotton cultivators in India. The final memorandum of the cotton crop of the season 1909-10 computed the acreage to be 20 227 000 acres, or an increase of 220 000 acres, and 4 502 000 bales, or an increase of over 800 000 bales compared with the previous year.

The predominant variety in the *Southern Mahratta* country is a species of the *Gossypium herbaceum* known as *Jowari halti*. In some respects it resembles Broach-district cotton, but its colour is darker and its ginning percentage is lower. The Cotton Department introduced a New Orleans Cotton, commonly known as American "Dharwar".

In the Deccan 1 500 000 acres are covered by cotton of the species *neglectum* which yields the inferior cotton of India.

In Gujarat out of a total of 3 600 000 acres, a third is devoted to a higher class of cotton known as *Naosari and Surat.* The tract which produces the finest type of this cotton in the Surat district is round about Jalalpur.

In all southern Gujarat, of all the exotics tried, the only one, Cambodja, at Surat, has given any promise of success. As regards Egyptian cotton in Sind, an expert says that no further extension of the area suitable for such sowing outside the Jamrao Canal District can be counted on till a further system of perennial canals is constructed. In the Central Provinces and Berar the soil and climate are inimical to exotic kinds. The Bombay Presidency is not only the larger cotton-producing district but grows a variety of cotton, the cultivators being keenly alive to obtaining a good quality to compete with foreign markets. The area sown with American Upland Cotton in the Punjab has enormously increased. In Eastern Bengal the best variety giving the most productive results prevails in the Garo Hills. The good quality of Hyderabad cotton has fallen greatly in estimation.

II. MARTIN LEAKE and A. E. PARR. **The Problem of the Improvement of Cotton in the United Provinces of Agra and Oudh.** (Agricultural Research Institute Pusa). The Agricultural Journal of India Vol. VI, Part. I, pp. 1-13 Calcutta, January 1911. **820**

British India

Though cotton is grown throughout the United Provinces, the tract where it is most largely cultivated and where the crop forms over 30 % of the total *Kharif* (1) area is situated in the western districts. Throughout this area, and throughout the greater portion of the rest of the Provinces a single species of cotton is cultivated which has been termed *Gossipium neglectum* Tod. by Gammie, but is classified as two varieties *var. neglecta* and *var. rosea* of the Linnean species *G. Arboreum* by Watt. Within this single species however a large number of forms exist which are distinguished by certain minor characters. Thus the flowers may be yellow or white, the leaves slightly or deeply dissected, and the glands of the leaf may be present or absent. The lint of all forms is short and coarse though there are degrees in the length of fibre and in the proportion of lint to seed in the Kapas. Further, though the lint of the widely cultivated forms is invariably white, a certain number of plants can be found here and there in which the lint colour is of a rich red brown or khaki colour.

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(1) Autumn crop. [*Ed.*].

Such is the condition of the main cotton crop of the Provinces at the present day. Its main characteristics are the shortness and coarseness of the lint and the great confusion of types which are, with few exceptions grown on one field. These types are the truly indigenons cottons of India. In addition to this the numerous importations of foreign seed chiefly from America, but also from Egypt which have from time to time taken place have left their mark on the Provinces and in most districts plants of this type can be found. There is one more group of cottons which is found as a crop within the limits of these Provinces, this is a group characterised by the *Radhiya* of the eastern districts and is the *G. intermedium* of Gammie.

In the extensive mixture of forms found throughout the cotton growing area, it has been found that comparatively few pure types exist. The remainder of the crop is composed of intermediate forms, the result of natural cross-fertilization. It is possible that by isolating the pure forms a superior form may be found and its cultivation introduced. The *Desi* types of cotton are notably heavy yielders with a high percentage of lint and in some districts even now are grown in a nearly pure state. Work on these lines is now in progress at Aligarh.

But owing to the extent to which cross-fertilzation takes place in nature it is a matter of some difficulty even to keep the more distinct types in a state of purity, and the improvement obtained by these means will be in the gross return only, the quality remaining practically the same. The main direction in which improvement is to be expected is to be found in the improvement of the quality, length and fineness of the lint. The ideal cotton plant possessing all these characters can only be obtained by proper cross fertilization. The length of staple occurs in the *Broach Bani*, and *Nurma* cottons. *Broach* cotton is unsuitable owing to the sterility of the crosses. *Bani* cotton is altogether too weak in habit and light in yield to form a field crop in these Provinces, while the *Nurma* cotton flowers too late to give any yield in the first year and has to be grown as a perennial. Moreover in both these forms the boll is small. Silkiness is characteristic of the Bani cotton and is confined practically to that kind. Hardiness and yield combined with a high lint percentage are essentially the characteristics of the Desi cottons of the Provinces and more especially of the white flowered forms, while for the size of boll the cotton of Assam stands before all others. The Nurma alone of the Provincial cottons possesses the red flower which would be a character of inestimable value in the early stages of introduction of a new produced variety to disclose any admixture or impure plants.

Two crosses have been actually effected and pure races isolated. But these experiments are yet in their infancy and the limits of improvement by no means reached. Numerous other crosses are now in various stages of cultivation and it is hoped that these will add still further improvements.

But the production of a plant with characteristics which render it suitable for cultivation in these Provinces, and which at the same time gives a produce of enhanced commercial value is only one part of the problem of improvement. There remains the all important question of the means by which such a plant can be introduced into general cultivation.

It seems essential to success that full control shall be kept over the crop during the early stages, over a centre of purity for the crop, a central area, or seed farm in which full precautions can be taken to keep the crop in a state of purity, and also to withhold introduction of the produce on to the market until it is available in sufficient quantity to attract purchasers. The controlling factor is the minimum amount of cotton which will attract the buyers and the area of this seed farm will be determined by the area it will be necessary to sow to provide this minimum. Placing this minimum at 500 bales of 400 lbs. the area to be sown must be some 1300 acres in the first year, seed for which will be given from an area of about 90 acres.

The cultivators of these 1300 acres will each year receive a fresh supply of seed from the farm and will not sow seed from the crop grown by themselves. This latter crop will be harvested separately ginned and the seed distributed to a second series of cultivators controlling some 20,000 acres of land under cotton. By these means only the seed farm would in a short period be able to establish the crop on a firm basis.

821 **The Egyptian Cotton Industry.** *Journal of the Royal Society of Arts*, N. 3040, p. 395. London, Febr. 24, 1911.

Egypt

A recent Khedivial decree has authorised the creation of a Department of Agriculture in Egypt.

Although no definite plans have yet been formed as to the work of the new administration, it is believed that it will have to do principally with the control of cotton culture, and by systematic surveillance to prevent over-irrigation of the cotton fields by native growers, who in the past have retarded the maturity of the plants by flooding the fields too frequently. The education of the native farmer as to the proper kinds of seeds to use, as to the best crop rotations, will, it is believed, also claim much of the attention of the new department. The Director-General is now visiting the cotton-producing districts with a view to gathering first-hand knowledge of the actual conditions that he will be called upon to supervise.

The Egyptian Government is experimenting on its Korashieh Estates with a new cotton-seed styled « Assili », which has produced approximately 800 pounds par acre. It is like « Afifi » in colour, but better in quality, and is expected to fetch about eight shillings and four pence more per hundred weight than any other variety cultivated in Egypt. The Ministry of Agriculture at Constantinople has asked the Ottoman High Commissioner in Cairo to send a quantity of Egyptian cotton-seed of the best varieties with a view to experiments in Turkey.

822 **Cotton Growing.** – *The Board of Trade Journal.* London. December 29, 1910.

Uganda

The most encouraging reports continue to be received from the Government of Uganda, concerning the suitability for cotton cultivation of the district to the North of the Eastern Provinces, in the vicinity of Kumi, Bululu, and the shores of Lakes Kwania and Kioga. In Balulu the area under cultivation has increased fourfold; although the country as a whole is sandy, it is in places endowed whith a rich cotton soil, and it is a district which offers great prospects for the expansion of the cotton industry in the near future. The soil in the neighbourhood of Bugondo consists of a black sandy loam rich in humus, which should be capable under good cultivation of yielding large cotton crops. In the Kuman country the condition of the plants is satisfactory, and there is an absence of pests; in the majority of instances 100 per cent of the seed planted has germinated.

823 DE MAZIÈRES. **Cotton Culture in Algeria in 1910.** (Les résultats de la culture du Cotonnier dans le Nord de l'Afrique en 1910). — *Bulletin de l'Office du Gouvernement de l'Algérie*, N. 6, pp. 86-87. Alger, 15 Mars, 1911.

Algeria

Cotton is cultivated in two ways in Algeria: on dry lands, as in the Philippeville region; and on irrigated lands, as in the valleys of the Cheliff and the Habra. The Egyptian Jumel varieties, the Mitaffi are found to give the highest yields and it is hoped by selection of the seed to produce a variety so early that the entire crop may be harvested before the November rains begin; the late autumn rains, however do not damage the fibre but interfere with harvesting operations. The cost of cultivation in dry soils round Philippeville is about 250 to 350 frs. per hectare, all included, but the results of culture without irrigation depend on the weather and may vary very much from year to year. On irrigated land the chances of failure are fewer, but the cost is greater, being about 500 frs, the hectare.

Irrigated land is calculted to yield from 1200 kg. to 1700 kg. per hectare; non-irrigated land 1000 kg. of unpicked cotton (*brut*) per hectare.

The planters form cooperative societies for the picking, packing and sale of their produce. The bale of cotton weighs from 200 to 225 kg. The seed is used for the manufacture of oil by the cooperative Society of Orleansville.

Algerian cotton has now a definite place on the markets; samples sent to the manufacturers of the East of France and of Alsace have been approved; the spinners have asked to communicate directly with Algeria, which may henceforth rank among cotton producing countries.

824 W. DAY. **Picking Cotton by Machine.** — *Scientific American*, vol. CIV., N. 9, pp. 231-232, New York, March 14, 1911.

United States

The greatest obstacle to the development of agriculture in the Southern States of the Union has been the necessity of utilizing hand labour in gathering the cotton crop.

The inventor has had his attention turned to this for a number of years, and various devices have been patented and constructed to take the place of hand labour in picking cotton. Until recently, however, all have been unsuccessful.

A mechanism has at last been invented which appears to solve the problem of harvesting cotton by machinery. This cotton machine is so adjusted that it picks only the bolls that are ripe or fit for harvesting and leaves those which are not matured. In one field a month or more may elapse before all the plants are ready for picking, and for this reason it is necessary to cover the ground at least twice by the machine, which operates so rapidly and is so efficient that the percentage of ripe cotton left after the machine has done its work is so small as to be insignificant as compared with the great waste which results from careless picking by the negroes. The machine picks about 10 pounds of seed cotton per minute, or 6000 pounds per day of 10 hours if kept running continuously. The quantity picked varies somewhat, depending on the amount of ripe cotton on the plants, but the above amount may be considered as a fair average. On the first trip it gathers 90 % of the ripe cotton, and the remaining 10 % is picked on the second trip. An average of thirty horse-power is required to operate this interesting cotton picker. A gasoline motor of 30 HP. is usually installed for the purpose. Beneath the engine are what are termed two picking attachments swung under it and a pair of canvas bags hung out behind. It moves over the field as fast as a man walks, the wheels passing along the spaces between the rows of plants.

The cotton is picked over by the revolving steel fingers which catch the lint but leave the plant uninjured, so that later bolls may mature. The picking machinery is on two drums which hang from the frame of the tractor. An endless chain of upright cylinders of small diameter follow each other around the drum. From these cylinders the needles or spindles which do the picking project horizontally into the plant.

In operation each part has its individual movement. The drum carries the cylinders round; the cylinders force the needles into the plant at the proper angle, to twist and catch the cotton.

Every motion is delicately adjusted. While the needles move fast enough to catch the fibre, their speed is not fast enough to throw it out of the receiver. The cylinders bring each needle into place at the proper time, so that there is never a space large enough for an open boll to pass through without being stripped of its contents. In the cylinders of each picker are no less than 816 steel fingers which harvest the cotton. One man is required to operate the engine. As to the cost, the maximum expense does not exceed five dollars a day, as shown by calculations made in Texas and other parts of the South. Except for a few green leaves, the cotton is as clean as, if not cleaner than, that picked by hand.

This remarkable invention may be called the life work of Angus Campbell, a Scotch inventor, who for many years has lived in Texas and has worked at his plans for over twenty years.

This method of harvesting the cotton has naturally interested the textile manufacturers, especially the experts of New England cotton mills. When the cotton reached the mill, it was decided by the experts that the machine picked cotton was slightly higher in grade than the hand picked cotton. In the picking, carding and other departments, the percentage of waste was the same to a fraction frequently.

In the spinning there was no greater breakage in the machine picked than in the hand picked. The breaking strength of the yarn showed a fraction stronger, one or two pounds stronger, in the machine picked staple. After it was woven it was bleached ,and in the finished state the machine picked cotton again showed slightly better than the hand picked.

The cotton was also subjected to a microscopical test to see if any fracture of the fibre could be discovered. There was none.

Flax Experiments in Ireland 1909. -- *Department of Agriculture and Technical Instruction for Ireland. Leaflet* N. 52, p. 15, Dublin, February, 1911. 825

United Kingdom: Ireland.

The first experiments conducted bythe Irish Agric. Department (1901-1904) on the manuring of the flax crop showed that it does not respond to the application of the more general nitrogenous and phosphatic manures in quantities usual with other crops, but that a profitable increase in yield may be obtained through the use of manures containing potash.

A second series of experiments was conducted during the years 1905-1908, from which the following conclusions may be drawn:

1. Whilst corresponding quantities of kainit and chloride of potassium give much the same increase, either of these manures is to be preferred to sulphate of potassium.

2. The time of application of kainit or chloride of potassium is a matter of minor importance.

3. Although in some seasons rape meal used in conjunction with kainit gave very profitable returns, the results were so irregular that the use of this mixture could not be recommended in preference to dressings of kainit or chloride of potassium.

The third series of experiments was instituted in 1909. The results may be summarized as follows:

1. The effect of potash manures in preventing the disease known as yellowing has once more been demonstrated.

2. The use of various mixtures of small quantities, (¼ to ½ cwt. per statute acre) of sulphate of ammonia and chloride of potassium (1 cwt. per statute acre) has given a higher yield of straw and scutched flax than was obtained from the unmanured plots, and in nearly all cases more straw, than chloride of potassium applied alone.

3. The mixture of 1 cwt. chloride of potassium, ¼ cwt. sulphate of ammonia and 2 cwt. steamed bone flour per statute acre gave, as compared with the unmanured plot, an increased yield of straw and a heavier yield of fibre in nearly all cases. But as the quality of the fibre was not materially improved and the small increases in yield were not sufficient to compensate for the cost of the manure, a loss estimated at 2s. 2d. per statute acre (6.70 francs per hectare) resulted from their use.

The chief effect of the addition of bone flour was to encourage the growth of weeds, just as had been observed from the use of superphosphate.

4. At two centres slaked lime and ground burnt lime, at the rate of 1 ton and 15 cwt. per statute acre respectively (4394 kg. per hectare) were included in the experiments. But at only one centre have these forms of lime produced an increase in the yield of scutched flax, and this increase was more than sufficient to defray the cost of the lime. At both centres the slaked lime gave better results than the ground lime.

5. The Pernau Crown seed imported by the Agric. Department produced more straw and fibre in 8 out of 10 experimental centres than the Belfast brand of Riga seed, and on the average of all

centres, £ 4 more scutched flax per statute acre (about 222 francs per hectare). The average returns were £ 1 10s. 7d. per acre (about 101 francs per hectare) in favour of the Pernau Crown seed.

6. In every case the home-grown *selected* seed gave higher yields both of straw and scutched flax than was given by the Pernau Crown, although the percentage of fibre produced from the straw was higher in the case of the latter.

826

J. C. OAKENFULL. **Brazilian Fibre Plants.** — *Brazil in* 1910 2nd Edition. pp. 280, Devonport, 1910.

Brazil

Among the greatest sources of wealth in the Republic are its fibre-producing plants. Brazil is one of the countries richest in the species of the Malvacea family. It is considered that *Guaxima vermelha,* if properly prepared, would rival *canhamo* (hemp). The *Urena* and *Triumpheta* are used under the name of *Aramina.* These plants in favourable situations, not too dry, produce fibres of 8 to 9 feet in length. In São Paulo some 12 500 acres produce about 800 tons annually, principally used in making bags for coffee.

Some malvaceae, known as *vassouras,* are hardy and very widely diffused; their more delicate fibres make good paper and the coarser fibres furnish material for brushes, ropes and twines.

In the valley of the river São Francisco principally, and also in the states of Minas and São Paulo, grows the *Linho Perini* (1) or Brazilian hemp (*Hibiscus unidens* v. *radiatus*). The strength of the fibre, as compared to hemp, is about 4 to 3. Some 2 500 000 square yards have been planted with the fibre. Each acre produces at present 3 195 lbs.

The north of the State of Rio, along the coast, is covered with *Bromelia Sagenaria,* (2) suitable for textile fibres, for 60 square kilometres. The pitaira, *Fourcroya gigantea* and *Fourcroya cubensis,* (Amaryllidaceae) is common in Brazil and may be found at all altitudes. The pitaira lives 10 to 16 years, requires 3 years to mature and gives 50 lbs. (22.65 kg.) of fibre for 1000 leaves. The minimum yield per acre is 1500 lbs. (1680 kg. per hectare) of fibre (1). The exportation of coco fibre is very far from being equal to the demand.

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(1) See page 69 in this Bulletin of Nov. 1910.

(2) A Bromeliacea, synonymous with *Ananas Bracteatus,* known in Brazil under the name ot Curratow or Grawatha. See G. HEUZÉ, *Plantes Industrielles.* T. 1. Paris, 1893. [*Ed.*]

Kapok (*Paina*) is produced in Brazil from the fruit of the various families of *Paneiras*. The best quality, *Paina branca* (white), is capable when used in life-belts, of supporting 30 to 31 times its weight; the kapok from Java (*Eriodendron anfractuosum*) supports only 26 to 28 times its weight (2). The *Paneira* is abundant in the States of Espirito Santo, Rio de Janeiro, Minas, São Paulo, etc.

Piassava (*Attalea funifera*) yielding the fibre from which brooms, brushes etc. are made, as well as the *Coquilho* nut, is found growing wild in Bahia, mostly along the coast, and in the south. It is a kind of palm, with just a cluster of tall leaves, growing in a sandy soil. Forests contain to an acre about 75 trees (187 to an hectare) which produce generally from 10 to 20 lbs. (4.53 to 9.06 kg) of fibre. each annually.

RELATIVE STRENGTH OF FIBRES.

	Diameter of cord (dry)			Diameter of cord (wet)		
	1.5 mm	2.5 mm	3.5 mm	1.5 mm	2.5 mm	3.5 mm
Arancina (*Urena lobata*)	14.0	24.0	—	—	—	—
Canhamo Perini (*Hibiscus unidens*) (Prepared by Dr. Perini)	10.2	20.5	—	11.7	22.5	--
Canhamo Prepared by the Agricultural Institute	9.5	18.2	—	15.7	22.7	..
Sisal (Pernambuco) (*Agave vivipara*) .	14.5	22.5	25.0	—	--	-
(Manilla) Canhamo (*Cannabis indica*)	7.0	15.5	31.5	22.5	27.0	68.5
(Madagascar) Raffia.	12.5	24.5	27.5	17.0	27.0	34.0

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(1) See this Bulletin No. 453, February 1911.

(2) See page 254 in this Bulletin, Dec. 1910.

Guaxima Fibres. (Fibras de Guaxima). — *Boletin de Agricultura*, N. 8, p. 760. São Paulo, 1910. **827**

Brazil

The "Guaxima" is a textile Malvacea, of the genus *Urena*, very common in Brazil. The commonest varieties are *Urena lobata* and *Urena sinuata*. The Guaxima is found in a great many regions; it is also known under the name of "Aramina".

The plant yields 34 % of fibrous material. When treated in the laboratory, it yields 26 % of pure fibre for its total weight. The dry fibres absorb 10.4 % of the moisture contained in a saturated atmosphere. An isolated fibre measures 19 *microns* in diameter.

RAPOSO LOUIS. **Caroa, a New Brazilian Fibrous Plant.** — *Bulletin of The Pan-American Union*, p. 346. Washington, February, 1911. **828**

Brazil

In the vast wilds of Brazil a fibrous plant called *Caroa* has been discovered, of which the supply is apparently inexhaustible. The plant is produced from a bulb and is of rapid growth. When stripped at maturity of its fibre, it takes but six months to reproduce a crop from 6 to 8 feet (1.83 to 2.44 metres) in length.

This fibre, manufactured into rope, shows a tensile strength ten times greater than Manila rope of like dimension. It takes 20 tons of the green *Caroa* to make 1 ton of fibre ready for shipment; but a large part of the wastage is said to be suitable for making paper.

W. MASSOT. **Textile Fibres of Nettles and Other Plants.** (Fortschritte auf dem Gebiete der Faser- und Spinnstoffe im Jahre 1910). — *Zeitschrift für angwandte Chemie und Centralblatt für technische Chemie*, XXIV J. H. 10. pp. 433-444. Leipzig, 10. März, 1911. **829**

Austria. Germany.

The Vienna firm of Kreissl and Seibert has invented an easy and complete process for removing the gum from the fibres of nettle *Urtica dioica* and *U. urens*. After previous attempts to utilise these plants, a practical method seems to have been found. The yield of pure bleached fibre would be of 13 %, worth about 83.75 fr. per 100 kg. The fibre is said to present the advantage of a gloss like that of silk, suppleness and flexibility. Besides this, there would be very important secondary products, the leaves as forage and manure, the stalks as raw material for paper, and the gummy matter removed from the fibres.

A German patent, R. Lütterlin, D. R. P. 224 593, has been taken out for extracting the fibres of the broom, (*Genista*), by digestion under pressure, beating and maceration. The bleached and soaked acquires a certain degree of suppleness.

Several other patents have been taken out for extraction under pressure, with alkaline or sulphite solutions, of the fibres from the fibre stalks of hops, sunflowers and nettles.

830 P. Baud. **Utilisation of Fibre Residues of Sisal Agaves.** (De l'utilisation de la pulpe de défibrage de certains Agavés). — *Bull. des Séances de la Société nat. d'Agr. de France*, N. 1, pp. 64-71. Paris, janvier, 1911.

Mexico: Yucatan

The industrial cultivation of Sisal, or "henequen", is the sole source of wealth for the greater part of the State of Yucatan, in the South of Mexico, where the soil is so arid that nothing but agaves will prosper. There seem to be an unlimited market and paying prices for sisal cord and string, notwithstanding the competition of Manilla hemp and other textile materials (1). The "sosquil" made with sisal fibre is white, supple, and resisting, and can bear without injury long contact with water.

Sisal has been introduced into Kamerun and India, where it prospers. Indian sisal fibre is quoted at 750 fr. the ton on European markets.

The botanical name of the sisal is *Agave rigida*, var. *sisalana*, its culture is remunerative not only for the fibre, but for yielding alcohol and pulp for paper; 50 000 leaves of sisal yield, for 1 120 kg. of dry fibre, a residue of fresh pulp of 27 to 28 tons, from which at least 700 l. of alcohol and 400 kg. of cellulose can be extracted. The pulp has too low a nutritive value to be used as fodder. It has been tried as a manure for plantations, but does not pay.

According to the writer, the annual production of a plantation of 500 hectares, where 80 000 leaves were daily stripped, would be the following:

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(1) Manilla hemp, or "Abaca", is obtained from the *Musa textilis*. See this *Bulletin*, Jan. 1911, 114; and Feb. 1911, 454. [*Ed.*].

Commercial fibre (550 to 600 fr. per ton)	700 tons
Alcohol at 90°	3 500 to 3 700 hectolitres
Pulp for paper	200 tons

According to M. Marquès, French Consul at Honolulu, the minimum profit per acre (0.404 ha.) should never be under 500 fr.

E. Saillard. **Manuring Experiments with Sugar Beet.** (Essais d'engrais sur la Betterave à sucre. Nitrate de soude, nitrate de chaux, cyanamide, kaïnite). — *Journ. d'Agriculture pratique,* 75ᵉ Année, N. 8, pp. 237-239. Paris, 23 févr. 1911. 831

France

These experiments were made in 1910, to compare the action of various nitrogenous fertilisers with that of the magnesia contained in kainit Nitrogen was given on various plots of 10 ares each, at the rate of 45 kg. the hectare. The soil was homogeneous and the plots were all cultivated in the same way and received equal treatments of farm manure and superposphate. The yield of each plot was weighed and its sugar-content determined. The following conclusions were reached

1) The effects on sugar production were pratically the same from sodium nitrate and cyanamide, given in the proportion of 300 kg. per hectare; calcium nitrate gave rather better results.

2) The plots where no potash was given had a higher yield than those that received potassium sulphate, but lower than those to which kainit was given.

The writer calculated the total nitrogen and the nitrogen of harmful compounds in the beets from the different plots, and he shows that as the nitrogen of harmful compounds has an influence on the quantity of molasses produced in the factory per 100 kg. of beets, beets of the same sugar-content have not necessarily the same value from a sugar-manufacturing standpoint.

Action of Fertilisers on the Sugar-Content of Beets. (Vliianié Mineralnik Udobrenii na sakharitosti chveklii). (*Trudi Iwanovskoi opetnoi Stanzii.* Vep. 4) — *Khosiaistvo* (*The Home*), VI G., N. 4, p. 123 - p. 27, Janvaria 1911. Kiew. 832

Russia: Kharkov

At the Agricultural Experiment Station of Ivanow, in the Government of Kharkov, experiments were carried out in 1904-1905 to ascertain the action of various fertilisers on the sugar-yield of beets. The following results were obtained:

Fertiliser used	Increase of Sugar content compared with Control
Sodium nitrate	+ 0.1
Potassium sulphate	+ 0.1
Superphosphate	+ 0.5
Superphosphate + Sodium nitrate	+ 0.5

Besides increasing the sugar-content, these fertilisers also increase the total crop, the real profit therefore is, on an average:

	Per dessiatine	Per hectare
With superphosphate	40 pud	600 kg.
„ sodium nitrate	15 „	221 „
„ potassium sulphate . .	3 „	35 „

833 **Sugar Beet in Nevada.** — *The Louisiana Planter and Sugar Manufacturer.* Vol. XLVI, No. 2, pp. 22-23, January 14, 1911, New Orleans.

United States: Nevada

The possibility of sugar beet production in the arid West, where satisfactory irrigation can be secured, was first demonstrated in Utah. Colorado, in like manner, began in a moderate way and rapidly expanded its sugar beet culture. Colorado has recently been surpassed by Michigan.

In Nevada, a company was organized, called the Nevada Sugar Company, and Messrs. Symmes and Means were commissioned to make investigations in Nevada with the idea of locating a sugar factory on lands that could readily be reached by the proposed irrigation systems.

The Truckee-Carson project is said to be well adapted to sugar-beet culture, as records of beets grown in 1906 indicated that none showed less than 14 per cent sugar or 80 per cent purity. The U. S. Deptm. of Agriculture had an experiment farm south of Fallon, Nevada, where the land was less desirable than that now under consideration, and the average of all the varieties here planted gave 19.8 per cent of sugar in the juice, or 18.2 per cent of sugar in the beets, with 87.2 per cent purity.

Mr. Mans estimates that at Fallon from 5000 to 7000 acres

(2000 to 2800 hectares) in beets will be needed to support a first class factory and he believes that this could be done with no haul of over 4 miles (6.4 kilometres) to the Fallon factory, with these lands all within the limit of the Truckee Carson project. In this area 20 000 acres (8000 hectares) are already cultivated in other crops, chiefly alfalfa. It is reported that about 50 000 acres (20 000 hectares) of land are being cultivated around Reno, 20 000 (8000 hectares) about Loveland, and it would seem that all these farmers could be induced to give some attention to beet culture.

The estimated cost of the sugar factory is 600 000 dollars (3 018 000 francs).

Sugar Cane in the British East Indies and in Louisiana. — *The Louisiana Planter and Sugar Manufacturer.* Vol. XLVI, No. 1, pp. 2-3. January. 7, 1911, New Orleans. 834

British India: Bengal. United States: Louisiana

In a report from the Dumraon Agricultural Experiment Station of the Bengal Department of Agriculture some interesting statements concerning the growth of sugar-cane are made.

Sugar-cane is stated to be a perennial, robust grass, with a stem reaching from 16 to 32 feet (4.86 to 9.72 metres) in height. This stem is cylindrical, solid, jointed and ending in a slender hollow tip, which bears the flowers. The roots are stated to be fibrous and wide spreading, either keeping near the surface of the soil or going down to a great depth.

In Louisiana these conditions are controlled almost entirely by the condition of the soil and the drainage. Imperfect drainage leads to the spreading of the roots near the surface of the soil, while deep or excellent drainage results in the cane roots going more deeply down.

The sugar-cane in India is said to have many enemies not only among insects but even among carnivorous animals, and jackals, wild pigs and monkeys have to be guarded against.

In Louisiana it is known that all domestic animals, including geese, are fond of sugar-cane.

In Bengal the canes are some of them thick stemmed, others thin. Some are drought-resisters, others require more water. Some are soft skinned and others hard; some are very long stalked and others short. The writer of the bulletin considerers the *khary* an excellent variety, withstanding drought and waterlogging very well. It resists the attacks of animals, insects and fungus pests, is very prolific, a good yielder and produces a good quality of *gur*, the indigenous name for *masse cuite*.

It is noticeable that in the preparation of the land a very large amount of work is done, the land being ploughed 8 or 10 times and harrowed 4 or 5 times. Irrigation is used to force the canes. Fertilizers are used to a very considerable extent chiefly of local production.

835 **Karité: its Butter Production and Commerce.** (Le Karité, sa production et son commerce) (1) — *Bulletin de l'Office Colonial*, 4e Cl., N. 38, pp. 33-39 | carte. Melun, févr. 1911.

French West Africa

The Karité, *Butyrospermum Parckii*, (Sapotaceae) commonly called the Butter Tree, frequently attains a height of 15 metres and sometimes a diameter of more than one metre. The fruit, the size of a plum, encloses generally one seed, occasionally two, rarely three. The shell of the seed is thin and covers the thick cotyledons from which the natives of Central Africa extract the karité butter.

This tree abounds chiefly on sandy and clay loams and on detrital laterite. It does not thrive so well on really silicious soils, nor where water lies in the rainy season. According to M. Ammann, the pulp represents 5 0 % of the weight of the fruit and the kernel contains from 45 to 50 % of fatty matter. Extraction may be effected by simple pressure after complete evaporation in the sun. The natives employ a long process which gives a poor yield and certainly not a better product.

Experiments on a large scale at Marseilles have yielded a firm white butter, with a very slight odour of cocoa, forming a first class product for European markets.

836 **The Coffee Tree of Victoria-Nyanza.** (Le Caféier du Victoria Nyanza). — *La Quinzaine Coloniale*, N. 4, p. 131. Paris, 25 févr. 1911.

British East Africa: Victoria Nyanza

Mr H. Powell has discovered in the Mau region on the Victoria Nyanza, a plateau between 6000 and 7000 feet in altitude which he thinks suitable for white colonisation. He has found there coffee trees of the *Coffea stenophylla* type growing wild in the forests, and samples of berries have been estimated in London at 41 s. 6 d. per cwt. (50.8 kg.).

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(1) See this Bulletin, November, 1910, p. 78, [*Ed:*].

It is calculated that after two years of colonisation the agricultural resources of this region might supply all its needs.

Coffee Production in Bukoba. — *Deutsche Kolonialzeitung*, N. 8. p. 127. Berlin, 25 Februar, 1911. 837

German East Africa: Bukoba

The production of coffee has increased very much, during the last few years, on the German side of Lake Victoria Nyanza. In 1905 the exportation was 235 000 kg. and in 1909, 300 000 kg. The production is almost all in the hands of natives, but under the control of Europeans, who have introduced the machinery necessary for the proper preparation of the product.

Coffee cultivation begins to increase also in Usambara, Kilimanjaro and in Meru, so that the last total exportation of coffee from German East Africa was not under 887 000 kg. The opening of the new railway, which is of the greatest importance to agriculture, will lead to a considerable development of the production of the Moschi district.

Coffee from the East Africa Protectorate and Rhodesia. — *Bulletin of the Imperial Institute*. Vol. VIII, N. 4, p. 365-367. London, 1910. 838

British East Africa Rhodesia

Two samples of coffee grown in the East Africa Protectorate were forwarded for examination to the Imperial Institute. One specimen consisted of evenly-coloured, dull green beans of rather irregular size. The parchment skins formed 14.4 per cent. by weight of the sample. The other specimen consisted of evenly- coloured, dull olive-green beans of irregular size and shape, but generally larger than those of the first sample. The parchment skins formed 22.2 per cent by weight of the sample.

The examination of the beans, after removal of the parchment skins, gave the following results :

	I	II
Moisture	10.86 %	10.71 %
Caffeine (in not dried beans) . . .	0.49 %	1.15 %
Number of beans required to fill a 50 cc. measure	415	297
Weight of ditto	32.8 grams	32.03 grams.

Coffee from Rhodesia. The samples forwarded for examination to the Imperial Institute were all grown in the Melsetter District. Their colour varied from pale brownish green to dull olive green; the number of beans required to fill a 100 cc. measure varied from 566 to 762; the weight of 200 beans, from 21 to 30 grams, the broken beans present in sample, from 3 ½ to 18 per cent. In conclusion, both the East African and the Rhodesian coffees were all of promising quality.

839 **Cacao on the Ivory Coast.** (La situation actuelle de la culture du Cacaoyer à la Côte d'Ivoire). — (*Journal officiel de la Cote d'Ivoire*) - *Bull. de l'Office Colonial*, 4ᵉ Année, N. 38. pp. 47-56. Melun, févr. 1911.

French West Africa: Ivory Coast

Cacao was introduced on the Ivory Coast about 1870 by natives coming from the British Gold Coast. Since 1908, its cultivation has gone through three phases.

A great impulse was given to the culture in 1908, by gratuitous distribution to the natives of a large quantity of seed, but owing to their indolence only those seeds succeeded whose cultivation was superintended by the Administration.

In 1909, the distribution of seed was made with a better acquaintance with local possibilities, and conditions of soil and climate. The number of seeds sown in 1909 is estimated at 1 million in round numbers. European colonists are laying out vast plantations, for which facilities are accorded by the Administration; practical instruction in the first operations of cacao-growing is given. This teaching is imparted by 14 « Monitors for cacao cultivation » who travel from village to village and apply on the spot, before the natives, the lessons they have received; they keep the Administration informed of all that goes on in their respective circles.

In 1910, using less seed, but with the same activity and greater experience, better results were obtained. The instruction of the natives continues and also their control by monitors. Special cases and questions are studied more closely; from each plantation experimental conclusions are drawn; the most favourable conditions of soil and season are chosen for sowing. The results are valuable. They show that cacao has taken possession of the country. The exportation, which in 1901 was 135 kg., rose to 3343 kg. in 1909 and to 1854 kg. during the first half of 1910.

840 H. FABRE. **Utilisation of the Residues of Tobacco Culture.** (Utilisation des résidus de culture du Tabac). — *Progrès agricole et viticole*, N. 7, pp. 213-215. Montpellier, 12 févr. 1911.

France

The stalks of tobacco, generally left on the ground, might be utilised for the manufacture of a cheap insecticide, by extracting the nicotine they contain.

M. Fabre has analysed samples of tobacco refuse of the *Nykerke* variety, from the Department of the Lot, and calculates that a hectare may yield:

327 kg. of dry stalks,
381 kg. of dry roots.

The average percentage of nicotine in these residues was:

stalks . . . . 2.215 % of nicotine in dry matter
roots . . . . 1.55 » % »

Each hectare of tobacco yields:

2.215 × 327 = 7.24 kg. of nicotine in the stalks
1.55 × 381 = 5.95 » » » roots

or total: 13.19 kg. of nicotine, generally thrown away as useless. At the usual price of 33 fr. per kg., this represents 13.19×33 = 435 fr. 25 per hectare. Notwithstanding the cost of extraction, if the price of nicotine remains at 33 fr., this extraction would be profitable on a large scale.

The writer indicates the principle of two relatively simple extraction processes: the Barral process, and the Debize process (1).

841 **Cultivation of Tobacco in Uruguay.** — *Bulletin of the Pan-American Union.* Washington, Jan., 1911, p. 183.

Uruguay

Tobacco culture is carried on at several points in the northern part of the Republic principally in the Departments of Tacuarembo and Rivera, and to some extent in Canelones and Montevideo. During the year 1908-09 there were 1910 acres under cultivation yielding an average of 774 pounds per acre. The total output for that year was 740 tons, yielding an inland revenue to the Government of 610 417 dollars.

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(1) Compare with this *Bulletin*, Nov. 1910, p. 74.

842

Tobacco from the Transvaal. — *Bulletin of the Imperial Institute.* Vol. VIII, N. 4, p. 404. London, 1910.

South African Union: Transvaal

The attempt to produce in the Transvaal a « bright » Virginia tobacco has been very successful. A specimen of this tobacco forwarded to the Imperial Institute, had good and fairly even colour though it showed a tendency to brown in some of the leaves. The average size of the leaves was 16 7 ½ inches (406 190 millimetres). The tobacco burnt excellently and the aroma and flavour of the smoke were moderately good.

On analysis the tobacco gave the following results:

	Per cent
Moisture	6.9
Nicotine	1.2
Total Nitrogen	1.6
Ash	7.5

843

L. Kunz. The Chemical Examination of Hops. — *Pure Products.* Vol. VII, N. 1, pp. 39-44. New York, January, 1911.

United States

The examination and judging of the value of hops as brewing material has hitherto been almost exclusively confined to mechanical analysis and examination to determine the extent of the sulphuring. Chemical methods of examining hops have now been so far improved and simplified that they will probably be used in future for commercial analysis. Of most importance in this connection is the determination of the amount of bitter substances on which the flavour-yielding value of the hops depends. The content of bitter substances of air-dried hops may range from 7 to 18 per cent, a difference of yield of more than 100 per cent. The method at present most used for the determination of the bitter substances in hops consists in extracting the preserving and bitter flavouring constituents of the hops, humulon (alpha acid) and lupulinic acid (beta acid), by means of boiling petroleum ether and titrating the alcoholic extract with one-tenth normal potash. The use of a special mill for grinding the sample so as to have the resin glands crushed, adopted by the writer in his analyses, has made a satisfactory extraction possible in 20 minutes' shaking, instead of 6 hours as proposed by Neumann.

Ten different samples of hops were analysed for bitter substances in accordance with the method described by the writer.

The following table gives the results of these analyses.

No	ORIGIN	Moisture	BITTER SUBSTANCES %			Approximative amount of seeds
			Shaken for 20 minutes	Shaken for 1 hour	Extracted for 6 hours	
1	German	7.1	10.6	10.6	10.8	Very few
2	Oregon	7.2	12.3	12.5	12.4	13 %
3	Bavarian	8.5	15.4	15.7	15.6	2 %
4	Imported	7.3	15.0	15.4	15.0	Very few
5	»	9.2	10.8	10.6	10.6	Few
6	English	8.3	12.8	12.8	12.9	Very many
7	»	7.4	9.6	9.7	9.7	Very many
8	Californian . . .	7.7	11.9	11.7	11.7	13 %
9	Unknown	6.2	6.9	7.1	7.1	5 %
10	»	6.0	7.1	7.1	7.1	5 %
Average			11.24	11.32	11.29	

L. HECKEL. **A New Anise Plant in Madagascar.** (Sur une plante nouvelle à essence anisée de Madagascar). — *C. R. de l'Acad. des Sciences*, N. 10. Paris. 6 Mars, 1911. **844**

Madagascar

A consignment of leaves and fruits with their stalks has lately arrived at Marseilles of a plant from Madagascar now appearing for the first time on a European market. It has a very strong scent of anise, or rather of *badiane* (1). This plant, which M. Heckel identifies with *Pelea madagascarica*, Baillon, is furnished in all its parts (leaves, fruits, and stalks) with cavities filled with a yellowish essential oil containing minimum proportions of anethol, but a high proportion of aldehydes, which are probably anisic aldehydes.

It is almost certain that this bush grows abundantly in the North of the island. The Malagasy name is not known.

Illicum anisatum, Chinese star-anise [*Ed.*].

845 D. DONON. **Revival of Saffron-Culture in France.** (La renaissance de la culture du Safran en France). — *Journ. d'Agriculture pratique*, Année 75. N. 10, pp. 310-311. Paris, 9 mars, 1911.

France: Loiret Seine et Marne

Saffron-growing, which once made the fortune of the Gatinais district (South of Paris) has rapidly declined, from scarcity of labour, the violet rhizoctone disease, and especially because of the competition of Spanish products. The area cultivated with saffron dwindled to 50 hectares in 1910, but prices have risen a little and competition is less keen. The saffron-growers have formed an Association and have decided to organise an experiment field for the study of the best methods of culture.

The Minister for Agriculture has accorded a grant of 12 500 fr. to be distributed in prizes to saffron-growers. The Association has decided to distribute the sum by giving 1 fr. 50 per are (100 sq. metres) to the owners of old plantations, and 2.50 fr. to the owners of new. The saffron-merchants have also decided to raise the price of the saffron of the Department of the Loiret, in order to keep up the reputation of the Gâtinais saffron, the aroma of which is far superior to that of other saffrons.

Under these conditions, saffron-culture may yield a profit of about 500 fr. per hectare, so that a revival of its cultivation may be expected.

846 **Onion-Growing in the United States, the Bermudas, and Mexico.** (El Cultivo de la Cebolla dejaria buenas utilidades en México). *El Hacendado Mexicano*, p. 75. Mexico, Febrero 1º de 1911.

United States. Bermudas. Mexico

The United States have an enormous consumption of early onions. Until lately, the greater part were furnished by the Bermudas, but within the last few years onion-growing has been introduced on a large scale in Texas, in Florida and in Louisiana.

In Texas, the district of Loredo alone sold early onions last year on the New York market for more than 2 $^1/_2$ million francs. In Texas, onions bring in 460 dollars net per acre (5860 fr. per ha.) or 15 times more than wheat. Owing to onion-growing, the district of Brownsville, once deserted, has to day more than 100 000 inhabitants.

The onions grown are an early Teneriffe variety called *Bermuda*.

There is an annual export from Teneriffe of 50 000 to 60 000 pounds of onion seed, yielding on an average 90 million kg. of onions.

Mexico, from its geographical situation and agricultural conditions, will soon be in a position to supply the North American market, dependent for the present partly on the Bermudas.

Jerusalem Peas in Jamaica. — *The Journal of the Jamaica Agricutural Society.* January, 1911, No. 1, p. 27. 847

Jamaica

Jerusalem peas have already become great favourites with banana planters, to grow as a green mulch under bananas. The Jerusalem pea creeps close to the ground and forms a thick, dense mass and does not climb up the bananas. The particular virtue of the Jerusalem pea is, that planted at any time from January to August, it will only blossom in October, but the earlier it is planted the more growth it makes. The Congo pea (1) is of the same nature but forms a bush, while the Jerusalem pea is a runner. Jamaica is able to supply larger quantities of this pea this year.

Peppermato, a Cross between Tomato and Capsicum in Tennessee. — *The Canner and Dried Fruit Packer.* Chicago, 26 Jan,. 1911. 848

United States: Tennesee

The peppermato is a cross between the tomato and the " pepper " (2). In appearance it resembles a tomato upon which has been grafted a full pod of capsicum. It was grown on the farm of Henry Cole, of Humboldt, Tennessee. As the tomato plants and " pepper " plants were in close proximity to each other, it is supposed that the tomatoes were fertilised with pollen from the capsicums. Whether this freak of nature can be called a fruit or a vegetable, remains for the scientists to decide. The new product is most accommodating, for it has catered to the tastes of the consumer. The capsicum pod does not affect the flavour of the tomato; and it can be removed by those who do not care for the combined flavour of tomato and capsicum.

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(1) Congo pea : *Cajanus indicus*, Spreng. [*Ed.*].
(2) *Capsicum annuum*. L. [*Ed.*].

849 A, W. Blair and R. N. Wilson. **Pineapple Culture and Soil. in Florida.** — *University of Florida, Agricultural Experiment Station.* Bull. 104, pp. 33-51. Gainesville, Flo. October 1910,

United States: Florida

The work here described was undertaken to determine.

1. The effects of different kinds and quantities of fertilizing materials on the formation of nitrates and on the qualities of the pine-apple crops.

2. The amounts of nitrate at different depths in the soil.

The question of nitrates is not a new one, but it has not been studied before in the Florida soils. The soil studied by the writers is a coarse white sand, containing over 99 per cent of insoluble matter.

The results may be summarized as follows:

1. Fine ground steamed bone and slag phosphate are best as sources of phosphoric acid; cotton-seed meal, dried blood, and castor pomace are best as sources of nitrogen; high grade and low grade sulphate of potash are best as sources of potash. Nitrate of soda, acid phosphate and kainit have not proved satisfactory; ammonium sulphate has in general practice been found unsuited to pine apple cultures. In case of shedded pineapples it has been found that it is profitable to use annually from 2250 to 3750 lbs. per acre (25.2 to 42 metric quintals per hectare) of a complete fertilizer.

The eating quality of the fruit (Red Spanish) is not affected by the kind of fertilizer used. Therefore the heavier fertilizer application increases slightly the sugar-content of the fruit, the large fruits containing a slightly larger percentage of sugar than small ones.

Pineapple plants contain sufficient fertilizing materials to make them of considerable value as fertilizer.

2. The quantity of nitrates in the soil is small after a depth of one foot (30 cm.) is passed, and they are much more abundant at the surface, where this is protected by a covering of decaying vegetable matter, than they are at a depth of a few inches. Twenty-six samples, taken from the immediate surface, gave an average of 50.6 parts per million of nitrates, with a maximum of 148.5 and a minimum of 13.7. Sixteen such samples gave an average of 0.081 per cent total nitrogen, with a maximum of 0.153 and a minimum of 0.051. Sixty samples, one from each plot, taken at the depth

of 9 inches (23 cm.) in November 1908, gave an average of 0.022 per cent total nitrogen.

Fruit-Farming in British Columbia. — *The Times* p. 20, London, February 20, 1911. 850

Canada

Up to the present time the existing duty has made it impossible to import apples from British Columbia into the United States, but with the removal of this restrictive impost, a large and new market will be opened up to fruit-growers in British Columbia.

The dry belt in British Columbia, where the best fruit is produced, and where a very large amount of British capital is invested in orchard lands, is the extension of the dry belt of the United States across the border, and it is claimed that the apples produced in British Columbia are even superior in quality to those which have made the orchards of Oregon and Washington famous. Proof of this fact is given in the results achieved by British Columbian fruit when exhibited at Spokane, Washington, in 1909, in competition with American apples. The opening of the United States market to the Canadian fruit-grower is of great importance.

The Canadian fruit-grower will be on equal terms with his American rivals in placing his products on the great markets of Chicago, New York, Boston and Philadelphia. There would seem to be no fear, for some years at least, of any thing like over-production for the American market, and there is a constantly increasing demand for British Columbian fruit in the prairie regions of Canada itself.

J. L. VIDAL. **The Reserves of the Vine.** (Les réserves de la vigne). — *Revue de Viticulture*, N. 895-896, pp. 157-162 et 189-197. Paris, 9 et 16 févr. 1911. 851

France

The writer made researches on the conditions under which the reserve materials of the vine accumulate in autumn, are preserved during winter, and distributed in spring. He found the percentages, at different seasons, of the hydro-carbons contained in the different organs of the vine. He ascertained that it is the root of the vine which acts as a reserve organ; and between the root and the branches there is a double annual migration.

Shortly before the normal fall of the leaves, the reserves in the branches are at their maximum; then begins the descending migration towards the root which, during hibernation, is the part of the plant best protected against cold. This preparation for hibernation sets in sooner or later according to variety, surroundings and atmospheric conditions. A short period of rest marks the turn of the current, about to ascend. Gradually, as spring approaches, a part of the reserve accumulated migrates from the roots towards the branches until after the opening of the buds. When the young leaves are in full activity, the ascending migration slackens and presently turns to descend again.

This double migration takes place in the same degree in grafted and ungrafted vines, its intensity only being occasionally modified by grafting.

This artificial connection may hinder the passage of starch towards the roots, but the obstacle gradually disappears as the affinity between graft and stock becomes closer. The aim is now to realise practically this condition, so that the root of the vine may more and more resume its reserve function.

852 COSME. **Products of the Vine in Malaga.** (Malaga. Ses vignes, ses vins et ses raisins). — *Rapports Commerciaux des Agents diplomatiques et consulaires*, N. 931, pp. 1-25. Paris, 10 février, 1911.

Spain: Malaga

For about 115 000 hectares in the province of Malaga that were under vineyards before the invasion of phylloxera, there are at present only 35 000. These vineyards are in three distinct zones. The most important, Axarquia, is on a Silurian formation; the zone called Hoya de Malaga is on fertile alluvial lands, rich in carbonate of lime; the third lies near the coast, partly on the Jurassic formations of the Serrania.

The first zone produces all the varieties of grapes known in the province, but chiefly the *Pedro Ximenes* and the *Moscatel*. In the second zone the *Moscatel* and the *Loja* or *Ohanes* are the most cultivated; the third zone, less fertile, yields only an inferior quality of *Moscatel* and *Pedro Ximenes*. The *Moscatel*, cultivated on the deep and fertile soils of the Vega, yields the grapes used for preparing raisins. The *Pedro Ximenes* is grown on rocky slopes, and is used for making the real Malaga wine. These are both white grapes.

During 25 years that the grafting has been done on American stocks no variation in the quality of the products has been perceived. It is therefore no longer possible to have doubts on this subject.

The favourite varieties of vine are: *Rupestris* × *Monticola, Chasselas* × *Berlandieri* 41 *B, Rupestris du Lot, Aramon* × *Rupestris Ganzin N.* 1, etc.

Labour is cheap, agricultural labourers rarely being paid more than 1.50 *pesetas* a day, or 1.50 fr. The vines are generally pruned very short, and are never supported by stakes or wires. The vintage takes place during August.

A hectare of land is calculated to produce, in Malaga, 14 hectolitres of wine, on an average. Two distinct classes of wines are made from the *Pedro Ximenes*:

1) The deep yellow wines, made by mixing the must of *Pedro Ximenes* with several other specially prepared musts;

2) White wines, in making which no mixing takes place, but the water contained in the grapes is party eliminated before vinification by exposing them to the sun. The wines are all made at Malaga, the farmers simply sending their musts to town.

About 600 000 kg. of fresh grapes are annually exported from Malaga. The dry raisins, like the fresh grapes, are produced by the *Moscatel* vine; these raisins are used especially for dessert, while Smyrna raisins and currants are used in confectionery. The province of Malaga produces annually about 12 million kg. of raisins, which are prepared chiefly along the coast. As soon as the grapes are ripe, they are spread on threshing floors, or *paseros*, where they are exposed all day to the sun. At night, they are covered with boards. After a few days, when the grapes are sufficiently «*cooked*» they are removed to warehouses. They are then classified, which is very important, the price varying according to the size of the bunches and of the grapes.

The grapes that break off the bunches are classified in their turn, according to size.

It is to England, at present, that the largest consignments of raisins are sent. This trade represents a movement of over 4 million *pesetas*.

853 B. BEDINI. **Fruits in Bags.** (L'insaccamento dei frutti). — *Bollettino della R. Società Toscana di Orticoltura*, anno XXXVI, N. 2, pp. 34-38, fig. 1-2. Firenze, febb. 1911.

Italy: Tuscany

The custom of putting bags on growing fruit not only often protects them against animal and vegetable enemies, but also improves the quality of the fruit itself. The skin is finer, the colour brighter, the size increases, the sugar-content is higher. The bags must, however, be removed from 8 to 15 days before the fruit ripens.

The colour of the paper used for the bags has a remarkable influence on the size and quality of the fruit. As temperature varies according to colours, there are advances and delays according to the colour of the bags.

In the orchard of the Pomological School at Florence, experiments were made last year on pears of the varieties *Duchesse d'Angoulême* and *Passe Crassane*, put into paper bags of different colours. The following table shows the results of the experiments:

Colour of paper	Duchesse d'Angoulême gr.	Passe Crassane gr.
Yellow	506	720
Trasparent light yellow of parchment type	531	685
Red	517	708
Pink	516	661
White	514	658
Light blue	508	640
Green	470	453
Dark blue	465	477
Fruit not covered	495	555

Green and dark blue should be excluded, having given results inferior to those of the fruit left uncovered. It may therefore be that these colours have a harmful effect on development and so on the weight of the fruit. In fruit covered in dark blue or green paper the skin retained the undecided green tint of unripe fruit.

854 SILAS C. MASON. **Drought-Resistance of the Olive in the South-Western States.** *U. S. Department of Agriculture, Bureau of Plant Industry*. Bulletin N. 192. p. 60. Washington, January 17, 1911.

United States

In several localities in Southern California and Arizona, olives, have been planted together with apricots, figs, grapes and some other fruits. The irrigation project under which these plantings were made subsequently failed, leaving the fruit trees without any water other than the rainfall.

The local annual rainfall of 3½ to 8 or 10 inches (88.9 to 203.2 or 254 millimetres) has proved insufficient to maintain life in any of these plants, except the olive.

The plantations which have been studied by the writer are the Bogart-Degolia grove near Casa Grande, Arizona, a grove near Florence, Arizona, and the Las Palmas grove in the olive belt northeast of Phoenix, localities having a mean annual rainfall of 7 to 9 inches (177.8 to 228.6 millimetres); and in California the Pope olive grove near Palm Springs, in the upper end of the Colorado Desert, where, with an annual average rainfall of only 3½ inches (88.9 millimetres), 20 acres (8.0920 hectares) of olives have survived six years without irrigation and are still growing.

The soils of the localities are sandy and gravelly clays derived from the disintegration of the soft granitic rocks of the adjacent mountains. They are poor in organic matter, but fairly rich in available phosphoric acid and potash. The soil at Palm Springs is a nearly pure granitic sand and gravel, very poor in silt, clay, and humus, but showing by analysis percentages of potash and phosphoric acid equal to the better agricultural soils of the Mississippi Valley.

Unlike some desert trees, the olive trees growing under these conditions do not survive by sending roots down to subterranean supplies of moisture, but develop instead a very elaborate system of roots occupying the soil at from 2 to 18 inches (from 50.8 to 457.1 millimetres) in depth and adapted to gathering moisture from the lightest rainfall.

The remarkable drought-resistance of the olive is made possible: 1, by the power these trees possess of extending their roots so as to gather moisture from a large area; 2, by their habit of growth in forming low spreading tops which protect the trunk and main branches from the heat of the sun; and 3, by the character of their leaves, which are constructed in a manner calculated to check evaporation and conserve the moisture obtained by the roots.

Plantings containing 75 to 114 trees to the acre (185 to 282 to the hectare) have proved too thick for successful growth without irrigation.

The varieties used in these orchards are those commonly grown in France and Italy, or, with irrigation, in California. In the North of Africa, olive trees grow with an average annual rainfall of 9.3 inches (236.2 millimetres). The principal varieties grown are probably of local origin, adapted to these conditions through years of selection.

Very wide planting allows a great spread of roots for moisture gathering, while a system of clean cultivation and dust- mulch conserves to the utmost the meagre rainfall. The most drought-resistant of these varieties, the *Chembali*, has been imported into the U. S. and is being tested in the South-Western States.

855 F. ADVISSE-DESRUISSEAUX. **Citrus Varieties in Anjouan, Comoro Isles.** (Les espèces du genre *Citrus* existant à Anjouan). *Agr. Pratique des Pays chauds*, N. 95, pp. 157-158. Paris, février, 1911.

Comoro Isles: Anjouan

In the Island of Anjouan the following *Citrus* species grow wild, either in clumps here and there in the waste lands, in the forests, or in the ravines: *C. Aurantium; C. Bigaradia; C. Nobilis*, var. *Vangasay*, Boj.; *C. hystrix*, D. C.; *C. limonum*, var. *sylvestris*, Juss.; *C. Medica; C. Limetta.* It would be worth while to cultivate them methodically, for the fruits in their present wild state do not suit the taste of Europeans.

The natives eat the wild orange and mandarine notwithstanding their acidity; the rind of the orange and the leaves of the orange, the lemon and the bitter orange are used in infusion against malaria (1).

856 JOHN M. TURNER. **Citrus Fruit in Porto Rico.** *California Fruit Grower*. p. 6. San Francisco. February 11, 1911.

Porto Rico

The growing of grape fruit, oranges and lemons on the island of Porto Rico has rapidly developed in recent years. Grape-fruit (2) are the most extensively cultivated. The average stand is 70 trees to the acre (175 to the hectare) yielding 700 boxes of fruit. The growing of oranges has been successful. However, native or wild oranges are also shipped to the United States. Lemons and limes are being sent to the New York market and the return will justify the extension of the groves devoted to these fruits.

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(1) It is noteworthy that in some parts of Southern Italy the use of decoctions of the rinds of *Citrus* fruits has long been considered both a preventive and a remedy against malaria.

See: ITALO GIGLIOLI, *Igiene antimicrobica.* Napoli, 1886. And especially:

CORRADO TOMMASI-CRUDELI. *Sulla preservazione dell'Uomo nei paesi di Malaria.* Annali di Agricoltura. Roma, 1883, pag. 23. [*Ed.*].

(2) Grape-fruit. *Citrus Decumana* (*Citrus Pomelanus*, Hort.), Pomelo, Pumelo, Shaddock, Pompelmosak. The Pomelo, or grape-fruit, is an excellent dessert fruit and is being very extensively planted, particularly in Florida. BAILEY. *Cyclopedia of American Horticulture*, Vol. I, p. 324. [*Ed.*]

The principal expense in citrus fruit growing in Porto Rico is the maintenance of wind-breaks and fertilization. Wind-breaks are absolutely necessary if the grove is exposed to the prevailing trade winds, which blow continuously for nine months.

The element most lacking in the Porto Rican soil is nitrogen, and as nitrogen fertilizer is expensive many growers have used a native pea called *gandule* (1), which grows quickly, and being a legume helps to store nitrogen in the ground; but it can hardly be called a permanent wind-break, as frequent replanting is necessary.

Shield Budding for the Mango. — *Agricultural News.* N. 229, p. 36. Barbados, Feb. 4, 1911. 857

United States: Florida

Shield budding of the mango has been with partial success practised in Florida for the last six years by experimenters in the propagation of this fruit. The percentage of successful buds was, however, so low, that the experimental work was temporarily suspended. However, experimentation has been continued by a few men interested in the problem; in some instances meeting with remarkable success. Success depends on the prime condition of the stock plant and on the free flowing of the sap; the buds should be selected from the well matured wood that is still green and smooth of the first, second and third flushes from the terminal bud, and cut rather large, 3 to 5 cm. long. The lower, thick part of the leaf stem at the end should not be trimmed off, but allowed to remain on the bud until it is shed naturally. It is essential that the buds should be inserted at a point in the stock where the bark is about the same age as the budwood, i. e. green and smooth, and the work done when the plant is in flush.

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(1) *Gandule* is the Spanish name of *Cajanus flavus*, D. C., a leguminosa used as wind-break in the tropics, and yielding peas of high nutritive value; it is a variety of *Cajanus indicus*, Spreng, known as the *Ambrevade*. See BAILEY, *Ibid*, p. 207, and FAUCHÈRE, *Culture pratique du Cacaoyer*, p. 73, Paris, 1906 [*Ed.*]

When the union has been effected, which will be in the course of two or three weeks, the stock should be pruned, off about 6 inches above the bud.

858 **Statistics and Yield of Forests in Würtemberg.** — *Forststatistische Mitteilungen aus Würtemberg für das Jahr* 1908, *herausg. v. der Königlichen Forstdirektion,* 27 J. op. 135. Stuttgart, 1910.

Germany: Würtemberg

of statistics Total results referred to the hectare:

YEAR	Production of wood over 7 cm. in diameter in cubic metres	Net product frs.	YEAR	Production of wood over 7 cm. in diameter in cubic metres	Net product fr.
1815	--	3.75	1870	4.05	32.30
1820	—	7.13	1875	4.34	52.70
1825	3.03	9.08	1880	4.28	33.28
1830	3.05	12.26	1885	4.37	35.82
1835	2.74	12.50	1890	4.47	41.02
1840	3.48	20.53	1895	4.49	47.01
1845	3.95	21.22	1900	4.83	63.40
1850	3.70	13.90	1905	5.34	70.27
1855	4.14	17.41	1906	5.82	84.82
1860	4.38	40.26	1907	6.02	93.00
1865	3.88	44.32	1908	5.68	81.28

Distribution of the data of 1908 by Districts:

Forest Districts		Net product per hectare, fr.	
Black Forest (45 055 ha.)	Herrenalb. (3414 ha.) Obendorf (390 ha.)	total 121.78	min. 62.60 max. 191.83
Unterland (41 492 ha.). .	Heilbronn (571 ha.) Dörzbach (835 ha.)	total 99.86	min. 22.17 max. 150.66
Nordostland (36 864 ha.)	(Sittenhardt (1380 ha.) Kapfenburg (2871 ha.)	total 103.56	min. 48.56 max. 180.22
Schwäbische Alb. (43 885 ha.).	Metzingen (290 ha.) Spaichingen (349 ha.)	total 63.23	min. 34.20 max. 99.47
Oberschwaben (23 787 ha.)	Ochsenhausen (1564 ha.) Weissenhorn (1323 ha.)	total 146.70	min. 88.41 max. 277.70

The total area under forests, which in 1819 was 191 755 ha., in 1908 was 196 025 hectares, of which 187 261 under forest trees, 2 822 occupied by fields, gardens, meadows, quarries etc. and 5 942 improductive.

The gross product was valued at 24 433 571 frs. in 1908, taking 21.35 frs. as the price of 1 m^3 of wood above 7 c.m. in diameter. The expenses, in the same year, amounted to a total of 8 598 256 frs., or 35 of the gross yield. The following are the trees represented, with their relative importance:

Oaks	4 %
Beeches	23 %
Maples, Ashes, Elms	2 %
Other deciduous trees	1 %
Silver firs	15 %
Spruces [epicea]	45 %
Pines	9 %
Larches	1 %

This gives a total of 30 % deciduous trees and 70 % conifers, where in 1887 there were 36 % of deciduous trees and only 64 % of conifers.

DE WELLE (Belgian diplom. Agent). **Forests in Servia.** — (Les forêts en Serbie). — *Recueil Consulaire*, t. 151, 6e Livraison. Bruxelles, 1910. **859**

Servia

The extent of the forests in Servia is estimated at 1 517 000 hectares, or 31.4 % of the total area of the country. Of the total forest area, 36.2 % belongs to the State, 42.8 % to the communes and villages, 1.1 % to churches and monasteries, and 19.9 % to private individuals. Deciduous trees form 90 % and conifers only 10 % of the total, beeches prevailing among the deciduous trees. The finest oak woods are in the Department of Topolitza.

The forests of the State cover 500 000 hectares, and are composed in the following proportions:

Beech forests	302 500
Oak »	137 500
Other deciduous forests	27 500
Conifer »	82 500

The forests of the State are scattered all over the country; the most extensive forest is in the Departments of Kraïna, Pozarewatz, of the Timok and of the Morava, calculated at about 120 000 ha. Conifers are most abundant in the region along the Drina, on the Tara plateau and in the Kopaonik mountains. In Southern Servia the State possesses various mountain forests covering together about 150 000 hectares. This immense domain remains closed to industry for want of means of communication.

In the budget for 1910 the production of the State forests is valued at 437 500 frs. the year; the forests are leased to the Administration of the railways. Until a few years ago, Servia was obliged to import wood for several million francs. At present the exports exceed the imports.

860 **Japanese Forestry.** -- *Bureau of Forestry, Department of Agriculture*, pp. 127, XII illus. app. Tokyo, Japan, 1910.

Japan This book on the forestry of Japan gives an excellent account of the actual condition of the Japanese forests and their management. According to the statistics of 1908, there are about 304 720 km² of forests and waste lands in Japan, or 67 per cent. of the total area of the country; of these 9 210 km.² form « protection forests » and the remainder « utilisation forests ». Their ownership is distributed as follows:

State forests	60	per cent
Imperial Domain forests	7.6	»
Religious foundation forests	0.4	»
Corporation forests	11	
Private forests	21	»
Total	100.0	»

The above distribution may be accepted as an approximation until the areas under each form of ownership have been fixed definitely.

There is a special Department for managing the Imperial forests, while a State Forest Department manages the State forests and controls the rest to a certain extent under the provisions of the Forest Law. Some 20 800 km.² of waste land are destined to become forests in the immediate future, except such as may be converted into pasture or farms.

The area of forests for each person is about 0.54. ha. The Japanese, however, are taking measures to increase the present large area of their forests.

The forests belong to four climatic zones:

I. Semi-tropical forests. — Average temperature, 22° C. Formosa and adjoining islands, below 550 m. of altitude.

II Warm-temperate forests. — Average temperature, 14°-22° C. Formosa up to 2090 m. Kyushu below 916. m.

III. Cold-temperate forests — Temp. 6°-14° C. Rest of Islands, except those in IV. up to 3330 m. in Formosa, 1830 m. in Shikoku and 530 m. in South Hokkaido.

IV. Sub-arctic forests. — Below 6° C. Kurile Islands, Northern half of Hokkaido and all Japanese Saghalien. Above 3660 m. in Formosa and 2 000 m. in Honshu.

Very little is said about the semi-tropical forests, where *Areca Catechu*, *Arenga saccharifera*, *Pandanus odoratissimus* and *Ficus Wightiana* grow. As useful material only bamboos are referred to.

The warm temperate zone contains the camphor tree (*Cinnamomum Camphora*), which, besides camphor, yields a hard, lustrous, durable wood that is in great demand. *Buxus sempervirens* grows on limestone to 16 m. in height, and 0.455 m in diameter, its wood being highly prized. There are several species of oak, the largest being *Quercus gilva*, Bl., which is shade-bearing and rarely forms pure wood, it is used for agricultural implements, rolling stock, etc *Quercus serrata* and *Q. glandulifera* afford excellent firewood and charcoal, also tanning bark, and are extensively coppiced. A valuable kind of fungus, « Shiitake », grows on the root of *Quercus serrata*

Pinus densiflora forms dense forests on clay soil, and next to *Cryptomeria japonica* yields the chief building material. « Matsutake ». another valuable fungus, grows on its roots. The wood of *Pinus Thunbergii*, as well as *P. densiflora*, is resinous, and very durable and is largely employed for bridges and other engineering works. It thrives on sandy soil near the sea-shore. There are several useful bamboos in this zone: of these *Phyllostachys mitis* and *P. Quilioi* are the largest.

The most important forests are those of the cool temperate zone, the chief conifers being *Chamoecyparis obtusa* and *C. pisifera*, *Cryptomeria japonica*, *Thujopsis dolabrata*, *Sciadopytis verticillata*, *Thuya japonica*, *Abies firma*, *Tsuga Sieboldi*, *Picea bicolor* and *P. polita*, *Pinus Koraiensis*, *P. parviflora* and *P. pentaphylla*, also *Larix leptolepis*.

Thujopsis covers large areas, either alone or mixed with beech (*Fagus sylvatica* var. *Sieboldi*). It is slow in growth, but yields important building material and railway sleepers. *Cryptomeria* thrives in sunny aspects, and next to *Pinus densiflora* is the commonest conifer in Japan, being used for buildings.

Chamoecyparis pisifera and *Thuya japonica* grow in mixed forests, and yield soft fissile timber. *Sciadopitis* is of slow growth and yields very durable timber. *Abies firma* and *Tsuga* yield good paper pulp. The spruces grow on mountains over 2000 m. but yield inferior timber. Japanese larch grows on places with warm aspects on the mountains, on dry soil of volcanic rock; its wood is durable and greatly prized for building purposes and telegraph poles. Its planting is now extended over Honshu and Hokkaido.

The broad-leaved trees of the cool temperate zone cover larger areas than do the conifers, but are generally mixed. *Zelkowa acuminata* is the species chiefly cultivated; its timber is hard but is easily worked and it is extensively used in decorative work. As in Europe so in Japan, beech covers the largest area of hardwood forest land. It is often united with conifers and with *Cercidiphyllum*, ash and maple. But it also forms extensive pure forests at about 330 m. above sea level. It is used chiefly as fuel.

Fraxinus mandshurica and *Cercidiphyllum* are used all over Hokkaido as building material, and are exported to N. China in the form of railway sleepers. *Cladastris amurensis* produces a beautifully lustrous wood, used for implements and decorative work. *Juglans sieboldiana*, mixed with ash, *Cercidiphyllum* and *Ulmus campestris*, var. *laevis*, grows abundantly in the valleys of Honshu, producing excellent timber.

Quercus crispula and *Q. dentata* grow in moist hilly situations, and their timber is used for railway sleepers, fuel, etc. *Populus tremula*, var. *villosa*, and *P. balsamifera* var. *suaveolens*, are used for matchwood; they grow on damp soil. *Castanea vulgaris* var. *japonica* grows with beech, *Thujopsis*, and other trees but is sometimes pure; its wood is used for railway sleepers. *Prunus pseudocerasus*, var. *spontanea*, *Acer palmatum* and *Magnolia hypoleuca* are found mixed with other trees; their timber is costly.

In the sub-arctic zone, *Abies sachalinensis*, *Picea ajanensis*, and *P. Glehni* form dense and often virgin forests. *Picea Glehni* yields the best timber, its wood being fairly hard. *Larix dahurica*, var. *japonica*, forms pure forests in the Kurile Islands and in Saghalien, andyields excellent durable timber. The broad-leaved trees of this zone include *Betula alba*, *Alnus incana* var. *glauca*, and *Pirus aucuparia*, var. *japonica*, all of which are abundant.

Besides the above Japanese timber trees, there are in the cool-temperate forests, *Aesculus turbinata*, *Alnus japonica*, *Fraxinus Bungeana*, *Gleditschia japonica*, *Celtis sinensis* and *Salix babylonica* which are planted as nurses and for soil protection.

As it has been found that the stock of the following trees is insufficient to meet the demand, the lands adapted for their growth have been investigated by the Department of Agriculture and Commerce. Seeds and seedlings are given gratis to planters. Experts are sent to supervise planting work on private land, and arrangements have been made for planting the following trees: — camphor, 197 100 000; poplar, 50 000 000; *Zelkowa acuminata*, 10 000 000; walnut, 24 000 000, lac tree (*Rhus vernicifera*), 8 000 000; wax tree (*R. succedanea*) 8 000 000, magnolia, 13 200 000 chestunt, 10 000 000; oaks, 90 000 000.

This is quite independent of the plantations made in the State and Imperial forests, where about 432 106 acres (175 600 hectares) have been planted, between 1898 and 1907, and there are over 1000 hectares of nurseries, in which 1 691 917 317 young trees have been raised from seed in ten years, and this apart from the rearing of *Cryptomeria*, *Thujopsis* and poplar from cuttings.

The up-to-date nature of forestry in Japan may be gathered from the fact that there is a Forest Association in Tokyo founded in 1882, and presided over by one of the Imperial Princes, which now includes 4 000 members. This holds monthly meetings for lectures and discussions, issues a magazine, and makes excursions to interesting forests. There is a committee of fourteen, who answer questions regarding forestry submitted to them by members of the Association. There are also twenty local associations, some of these being subsidised by the local governments; they raise seedlings for distribution among their members, and provide forest experts to prepare working-plans and to lecture.

As regards forest education, there are 47 forest schools, two of University grade, four of Technical College grade, and 41 of Industrial School grade.

The Forestry Experimental Station is at Tokyo and has broad lines of investigation laid down. Experimental work is also carried on at four district offices.

The following shows the financial aspect of the State and Imperial forests of Japan:

	State forests			Imperial Forests		
Year	Receipts *fr*	Expenditure *fr*	Net *fr*	Receipts *fr*	Expenditure *fr*	Net *fr*
1898	3 665 441	2 141 750	1 522 091	2 701 135	1 107 970	1 593 165
1901	5 495 713	2 573 606	2 922 107	—	—	
1904	7 284 044	2 885 746	4 398 298	—	—	—
1907	19 301 766	4 925 239	14 376 527	5 427 740	2 102 820	3 324 920

It is noted that the net income from the Japanese State forests has increased about eight fold in ten years. Nothing is said about the financial yield from private forests, but it is implied that they are more favourably situated than State forests. The Bureau of Forestry controls also the commercial and private forests. The Forest Law of 1897, revised in 1907, outlines the method of control. The number of employés of the Bureau is now about 2500, the greatest recent increase having been made in the number of rangers. Fire lines are constructed on the larger tracts and burned over in the autumn. Working plans of 7 per cent of the State forest had been completed in 1907 and plans are laid for finishing both surveys and working plans within definite periods of 15 to 20 years. Working plans have been similarly prepared for Imperial forests. Private forests are usually in poor condition and government aid is applied in several ways, *viz.*: Subsidising nurseries, giving seedlings or subsidies to those planting forests, establishing model forests and nurseries, and giving public lectures.

861 **Siberian Forests along the Coasts of the Japan Sea** (Liesa Poberesia Japonskago Moria). — *Isviestia Glavnago Upravlenia Semleustriostva i Semledielia* (*Journal of the General Direction of rural and agricultural organisation*), N. 6, pp. 165-168. S. Peterburg, 6 Fevralia, 1911.

Russian Empire: Siberia

Till lately very little was known of the nature of the forests covering the lower basin of the River Amour, which extend over no less than about 150 000 000 dessiatines, or 160 000 000 hectares. Only within the last few years these forests have begun to be explored, and their proximity to the great river and to the sea coast should facilitate their exploitation.

In 1910, the special Committee appointed for the purpose prepared proposals for the exploitation of the forests of Imperatorskaia Gavan, Bukhta Vanina and Bukhta Ternei, occupying respectively a surface of 60 689, 68 251, and 62 271 dessiatines.

In the first two forests there are two principal types. 1st type: Silver firs on the slopes, mingled with spruces (*epicea*); and larches and cedars, which prefer light-coloured clays.

FIRS.

Age	100 to 120 years	130 to 140 yrs,	150 to 170 yrs	180 to 200 yrs.
Diameter. .	13 to 18 cm.	22 to 31 cm.	35 to 44 cm.	48 cm.
Height . . .	13 to 16 m.	17 to 20 m.	21 to 24 m	25 m

2nd type: firs and larches, mingled, on high clay soils, with spruces (*epicea*) and birch. The growth of the firs in this section is much more rapid than in the first·

FIRS.

Age . . .	100 to 120 years	130 to 140 yrs	150 to 170 yrs
Diameter. .	13 to 31 cm.	35 to 44 cm.	48 cm.
Height. . .	17 to 21 m	22 to 23-50 m.	24 m.

LARCHES.

Age	100 to 120 years	130 to 140 yrs.	150 to 170
Diameter. .	10 to 31 cm.	35 to 44 cm.	48 to 52 cm
Height . . .	19 to 22 m.	23 to 24.85 m.	25.40 m.

In both these types of forest there is an average of 80 to 100 trunks per dessiatine, of which 10 to 20 have a diameter of 35 cm. and more. The dimensions preferred in commerce are: diameter, 35 cm. (48 cm. at soil level); height, 7 metres; these dimensions are attained between 170 and 190 years. With a 60 years rotation, an annual yield might be attained of 43 700 trees from the forest of Imperatorskaia Gavan, and of 25 705 from Bukhta Vanina.

At Bukhta Ternei the following types of forest may be distinguished: 1. Cedars in great predominance, mingled with firs and larches, or more rarely, birches, oaks, maples, aspens etc.; 2. Larches mingled with cedars, and sometimes with oaks and birches; 3. Larches, cedars and birches on sandy soils. The following are data on cedars:

Age . . .	70 years	90 yr.	100 to 110 yrs.	120 to 12[illegible] yr	1[illegible]0 yrs	[illegible]	[illegible]
Diameter	13 to 16 cm.	16 to 26 cm.	22 to 50 cm.	[illegible]	[illegible]	[illegible]	[illegible]
Height .	11 to 15 m	11 to 16 m	15 to 18 m.	18 to 20 m	21 m	2[illegible] m	[illegible]

The annual average production of this forest is 9721 cedars, 1275 larches, and 3876 firs, or a total of 14872 trees.

862 **Forestry in British Columbia.** — *Journal of the Royal Society of Arts.* — London, p. 414, March 4, 1911.

Canada: British Columbia

British Columbia grows half the saleable timber of the Dominion of Canada, its forest area being fifteen million acres, capable of yielding under present methods nearly two hundred billion feet super of timber. Of this area nine million acres are held under a special licence system. Options to cut timber during a twenty-one year period on specified square miles of forest are granted, but at the same time the provincial Government retains an effective control by reserving the right to fix from year to year the annual payments in rental and royalty to be made for the renewal of these options, and also to impose a reserve upon all remaining Crown Timber. The demand for timber willraise the value of the British Columbian forests to heights now considered impossible. With careful management, these resources should permanently relieve the people of the province from serious taxation.

863 F. W. RANE. **Reforestation in Massachusetts** *American Forestry*, Vol. XVII, N. 3, p. 160-163.5 fgs. Washington. D.C., March 1911.

United States: Massachusetts

As a result of the educational campaign carried on by the Massachusetts Forestry Department, there has been a general awakening on the part of the public, especially land-owners, to the opportunities afforded for profitable investment and future development by reforestation in the Bay State.

As the white pine (*Pinus Strobus*, L.), a natural conifer of Massachusetts, is a tree of comparatively rapid growth, the first work of importance done by the present State forester was to make a study of its growth. The age at which a plantation should be cut to yield the highest net returns is 50 years, and an acre of pine planted on average soil will produce at the rate of 900 board ft. or more, per year. This information is of great value to farmers, as it makes clear how the waste land of farms may be utilized and made to become of constantly increasing value. Supposing the value of land at the time of planting to be $ 6 per acre the cost of planting $ 10, taxes at 2 per cent.; an acre of pine will yield 4 per cent. on the money invested, and $ 270 besides, a total between six and seven per cent. These figures are based on the present prices of lumber, and not the probable prices fifty years hence. The legislature, within the past five years, has recognized the immense possibilities of forestry as a factor in adding to the wealth of the State, and has enacted several laws based upon recommendations of the State forester to make about forty separate plantations covering 2 000 acres, at an average cost of less than $ 10 per acre. Much of this land was acquired by the Commonwealth under the provisions of the law which allows owners to turn over land to the State for the purpose of reforestation, reserving the right to redeem the land at any time within ten years, for the actual amount expended. Nearly 1 500 acres of land are now in the hands of the State forester for planting next season.

The plantations scattered all over the State have been of great interest to property owners, and have done much towards stimulating private enterprise along this line. The records at the office of the State forester show that in addition to the 2 000 acres planted under his direction, 3500 have been planted by other agencies, among others the Metropolitan Water and Sewerage Boards.

A. Fiori. **Forests and Timber in Eritrea.** — (Boschi e piante legnose dell'Eritrea). — *L'Agricoltura coloniale*, Anno V, fasc. II, pp. 41-61. Firenze, febbraio, 1911. **864**

Italian Colonies Eritrea

Mr. Fiori gives a list of the shrubs of Eritrea, among which the following are used, or might be used, commercially :

Aerva tomentosa, Forsk, called *Gennafer*, the inflorescence of which is used for stuffing furniture and cushions ;

Phytolacca dodecandra, L'Herit., called *Schibti ;* the fruit contains saponines and is used commonly as saponaria. The writer thinks the culture of this plant might be advantageously introduced in Southern Italy.

Opuntia ficus-indica, Mill. ;

Gyrocarpus asiaticus, W. yielding a very light wood suitable for packing purposes, which in India is painted and varnished. These are trees which grow rapidly and are easily multiplied ;

Boscia angustifolia, Rich., yields wood which would be suitable for cabinet-making, if it were possible to eliminate the disagreeable odour which persists even in the dry wood ;

Crataeva religiosa, Forst., a tree growing to about 6 metres, which yields a yellow wood suitable for making household articles. Its disagreeable odour disappears when the wood is dry ;

Pittosporum abyssinicum, Del., which has a rosy white wood, of a fine and compact texture ;

Rosa abyssinica, R. Br., the wood of which resembles that of our common rose, and the stem of which reaches a diameter of 6 cm.

865 FAMECHOU. **Forest Resources of the Gabon.** — (Les Ressources forestières du Gabon). – *Bulletin de l'Office Coloniale*, N. 58, p. 56. Melun, févr. 1911.

French Equatorial Africa : Gabon Colony

The Okoumé is a variety of mahogany of low specific weight. At 40 years it measures about a metre in diameter at the base of the trunk, which rises to a height of 10 metres before throwing out branches. It is easy to cultivate, and valuable for cabinet-maker's work.

The total export of wood from the Gabon last year was 70 000 tons, of which 55 000 were okoumé, 5000 mahogany, 3000 ebony, and 7000 of various woods, among which coral wood and walnut. The exportation of okoumé has sometimes been as much as 250 000 tons. Of Gabon mahogany (*Sarcocephalus Diderichii*) 50 000 tons may be produced yearly, and of ebony (*Diospyrus Dendo*) 10 000 tons.

The coral wood, or *padouk* (*Pterocarpus ougolensis*) is the most beautiful wood of the colony. It is blood red streaked with black when fresh and in seasoning takes the colour of palisander, or rosewood. Notwithstanding its hardness, it is easy to work. The present exportation, of 1000 tons annually, might easily be increased ten-fold.

The *Kambala*, a golden yellow wood, recalls the Hungarian oak. The *Mandij* is like it, but closer and harder. The *Diléba* is very like Asiatic teak.

The Gabon walnut, lighter than European walnut, may yield 15 000 tons for exportation. The *Ndouka* has a grain like that of mahogany, but is hard, solid, and as resistant as the best oak. At present the exportation is only 2000 tons but will certainly come to be more than 25 000 tons. Very like the *Ndouka*, but of a dark reddish brown, is the *Todo*, suitable for furniture and parquetry. Of *Bilinga*, a golden yellow wood of the family of the *Sapotaceae*, a thousand tons are exported. *Mowinqui* is like acacia wood, but is much harder. The rosewood and the *Zingana* are rare woods, to be used in cabinet-making and for costly furniture. The *Zingana* which is yellow, veined with black, is a splendid wood and has no equal.

F. HAAS. **Re-foresting on Peaty Soils.** (Bericht über die waldbaulichen Versuche der Moorkulturstation Sebastiansberg, im Jahre 1910). — *Oesterreichische Moorzeitschrift*, J. 12, N. 12, pp. 17-19. Staab, 15 Februar, 1911. **866**

Austria: Bohemia

According to results obtained hitherto on experimental re-forestation soils at the Experiment Station for the cultivation of peat soils at Sebastiansberg, the trees suitable for planting on reclaimed bog soils would be ·

a) In peat soils not exposed to frost, the best forest tree is above all the common epicea (*Picea excelsa*, Lk.); the blue epicea (*P. pungens*, Engelm) and the black epicea (*P. nigra* Lk);

b) In peat soils exposed to frost, the black epicea comes first, then the blue and the common epicea. Among deciduous trees for protection of the conifers, the birch is best, then the alder (*Alnus glutinosa*); among conifers, the Weymouth and the Banks pine, then the mountain pine and the pitch-pine.

The following are the heights attained in 1909 by some of the trees under experiment ·

KIND OF TREE	Plantation Age	Plantation Year	Height cm.
Common Epicea	4	1905	40-60
	5	»	50-74
	4	1906	36-45
	5	»	41-50
Blue »	5	1905	41-62
Black »	4	»	46-48
Weymouth Pine	2	»	44-53
Banks Pine	»	»	53-75
Mountain Pine	»	»	37-40
Pitch Pine	»	»	31-45

867 R. WALLENBÖCK. **Influence of Northern or Southern Aspect of Woodlands on Soil Moisture.** (Die Klimatischen Unterschiede auf Nord- und Sudlehnen in ihrer Beziehung zum Wassergehalte des mit Altholz bestandenen und abgestockten Waldbodens). — *Centralblatt für das gesamte Forstwesen*, J. 37, H. 2, pp. 51-63. Wien, Februar, 1911.

Austria

Theoretical considerations and scientific experiments have led the writer to ascertain the following facts for the locality which he studied, the Wiener Wald.

Modifications in the climatic factors of soil moisture produced by afforestation and by clearing:

1) Cleared soil receives more rain than wooded soil.

2) Evaporation due to movements of the air has more importance in woods than on cleared areas.

3) The evaporation on cleared areas depends chiefly on insolation.

4) On cleared areas the evaporation due to insolation is more compensated by the frequent rains in wet years than on wooded areas.

5) There is a slightly higher rainfall on northern slopes than on southern.

6) Evaporation due to the movement of the air is slightly greater on southern slopes than on northern.

7) Insolation, and consequently temperature are much stronger on southern slopes than on northern.

Whence the following conclusions concerning soil moisture:

I. The soil moisture is greater, whether on northern slopes or southern, and whether the annual rainfall be high or low, where the surface is cleared than where it is wooded (with beech).

II. In years when the rainfall is very high, the soil moisture in cleared areas is more on the southern slopes and less on the northern in comparison with wooded surfaces.

III. The differences in soil moisture between cleared and wooded areas are greater on the sunny slopes in wet years; and in dry years, on the contrary, the differences are greater on the shady slopes.

III. The difference in soil moisture of cleared areas with different aspects is greater in dry years and less in wet years than in wooded areas with different aspects.

868 R. T. Baker and H. G. Smith. **A Research on the Pines of Australia** (Technological Museum, New South Wales, Technical Education Series, N. 16, pp. xiv 460, 1910). *Abs. Nature*, N. 2154, vol. 85. p. 465. London, February, 9, 1911.

Australia

The main object of the writers' investigations was to ascertain the commercial possibilities of the various species of Australian Coniferae

The genus *Callitris* (otherwise *Frenela*) is almost restricted to Australasia (Australia and Tasmania) and is the only genus of Coniferae of general dispersion covering vast areas in Australia. Two species occur in New Caledonia and 18 in Australia, where they are spread over the whole country.

Mr. Baker gives full details of the distribution of the Australian Coniferae, but more especially within the State of New South Wales. *Callitris glauca* is found in all the States, but nearly always away from the coast. In the State of New South Wales it is known to occur in 87 counties, covering hundreds of thousands of acres. *C. Glauca* is perhaps the most important of all the small trees of Australia, as its timber, as well as that of other species of *Callitris*, is impervious to the white ant.

The chemical composition of the various products and the anatomical structure of the trees, the results of very protracted investigations, are given in considerable detail.

869 Walther. **On Douglas Pine Varieties.** — (Die Douglasie im Winter 1908-09). *Allegmeine Forst- und Jagd-Zeitung*, L. XXXVII. pp. 11-13, pl. I. Frankfurt a M., Januar, 1911.

Germany

The writer points out the irregularity in development and colour noticeable in many nurseries of Douglas pine, and remarks that there are two distinct varieties of this pine: the Oregon variety and the Colorado, which should on no account be confused. The Oregon, which was the first to be introduced into Europe, requires more favourable conditions, being a native of a warm, damp climate; while the Colorado, bluish in tint, and growing more slowly, adapts itself to less favourable climates.

It is therefore a mistake to mingle the two varieties, just as it is a mistake to plant the Douglas pine with the spruce (*Picea excelsa*), especially as it is still expensive.

Precaution is necessary in buying the seed, that it should be genuine, as there is a great demand for it.

870 E. VADAS. **Importance of the *Robinia pseudo-acacia* in Hungarian Forestry.** — (L'importance du Robinier dans la foresterie hongroise). — *Annales de la Science agronomique*, 28 Année, N. 2, pp. 92-110, figs. 7. Paris-Nancy, février, 1911.

Hungary The Acacia (*Robinia pseudo-acacia*) has been successfully used in Hungary for fixing shifting sands, of which only small remnants are now left here and there.

Plantations have recently been formed for the production of poles, for which there is an increasing demand, to be cut, generally, every 10 years. Parts of forests already existing have been transformed with the same view.

The following is an example of the produce of these plantations:

State Forest administration at Isaszeg; area 20.7 ha. age 25 years. Produce from one cutting, 1500 stems per hectare, equivalent for the whole surface to:

		Cost of production per 1000	Total cost
	frs.	frs	fr
4000 poles, 2 m. long, split, at 40 frs. the 1000	160	9	36
6000 poles, 2 m. long, round, at 24 frs p 1000	144	8	48
74000 poles, 1-6 m long, split, at 29 frs p 1000	2140	7	518
12000 poles, 1-6 m long, round, at 20 frs p. 1000	240	6	72
22 mc. timber, at 13.20 frs	277	6	72
426 cubic m. of stakes (*rondins*) at 5 frs. . . .	2130	5	213
160 cartloads of sticks at 2 frs.	320	5	213
Total product	5417		887
Net » per hectare	219 80		

In the State forests at Valko, under similar conditions, there has been a net yield of 164 frs. per ha.

The *Robinia* does very well, on good soils, for timber plantations, with 50 years rotations, and mingled with shade trees.

The forest statistics give the following figures per hectare:

Administration of the State forests of Szabadka. Good soil, brown sand:

Age, 32 years; number of trunks, 616; volume of stems alone, 242 cubic m.; average trunk, height: 23.3 m.; diameter, at height of a man, (1.30 m.) 21.9 cm. ; volume, 0.392 cubic m. Coefficient of form, 0.44.

On an average soil :

Age, 32 years ; number of trunks, 592 ; volume, 117 cubic m. Average trunk, height : 18.1 m. ; diameter 18.5 cm. volume, 0.198 cubic m., coefficient of form 0.39.

On a bad soil :

Age, 32 years ; number of trunks, 203 ; volume, exclusive of small branches, 5 cubic m. Average trunk, height : 5.85 m. ; dameter 9.5 cm. ; volume, 0.0247 cubic m., Coefficient of form, 0.40.

For utilising simple coppices the following data of extremes may serve :

Age Years	Diameter at 1.30 m. cm.	Height m.	Number of trunks per ha.	Volume cubic m. per ha.	Annual Growth current cub. m. per ha.	Annual Growth average cub. m per ha.
10	5.2-10.6	7.3-14.6	3945-1430	15.7-113.0	2.1-14.6	1.6-11.3
20	8.9-16.8	11.3-20.2	3048-905	43.5-256.0	2.8-14.3	2.1-12.7
30	11.4-21.2	13.1-23.8	2506-713	78.3-346.0	3.5-9.0	2.6-14.5
40	13.2-24.2	14.3-25.9	2163-641	97.0-400.0	1.9-5.5	2.4-9.9
50	13.9-26.1	14.9-27.1	2031-626	104.0-435.0	0.7-3.5	2.1-8.7

The products of coppices are classified as: stumps, (*cépées*), trunks (*têtards*), thinnings (*arbres d'émonde*) and underwood (*sous futaie*).

The growing of trees in connection with field-culture is common in Hungary, the Robinia being employed both for timber and as coppice; it is no longer planted as much as formerly because most of the suitable land is already wooded. About 20 yearsago, Robinias covered 35 000 ha. or 0.5 % of the total forest area; in 1903, 60 000 ha. or nearly 1 %, and now about 70 000 ha. are covered with acacia forest. These figures do not include small plantations, boundary trees, or those planted along the roads etc. which form a large number. Thenumber of Robinias planted annually, generally of one year's growth, is very great. The State nurseries alone distributed the following :

1903	18 684 000
1904	21 158 000
1906	27 239 000
1907	24 637 000
1908	19 639 000

The writer says, in conclusion: in Hungary the Robinia has conquered all the country up to the lower mountains. In sandy regions, it is the only important forest tree on thousands of acres, and is therefore of the greatest importance both economically and as a forest tree. Providing the steppes with excellent wood, fixing the shifting sand otherwise useless for cultivation, and blown by the wind over cultivated lands, the Robinia improves the soil where it grows. It also contributes to the wealth of the peasants by its richness in honey, and further, the great rise of fruit and vine culture in the heart of the country is due largely to the Robinia, which alone has been able to fix the sand and render it productive. Lastly, owing to these extensive reforestations, the steppes enjoy a more temperate climate.

871 **The Mangrove Bark Industry in Australia.** *Journal of the Royal Society of Arts.* N. 3040 p. 307. London. Febr. 24, 1911.

Australia A company has been formed in Sydney for utilising mangrove bark to meet commercial demands for tanning and dyeing purposes, and concession has been obtained from the Government of Queensland for taking the bark from trees on land near the coast of North Queensland, between Cooktown and Cape York (1). It is said that the supplies of black mangrove trees in the northern part of Australia are almost unlimited, the forests being found along rivers, creeks and estuaries near the coast, frequently on mud flats, which are inundated at high tides. Many of the trees grow large, and permit of poles fifty-feet long being cut, while from a single tree, upwards of a ton of bark has been stripped. Previous attempts to make commercial use of Australian mangrove bark have not met with success, owing to the high freight in shipping the bark to countries equipped with plant suitable for treating it, but the present plan contemplates conveying the bark to a factory near the trees, where it can be dried and crushed, and the cutch made into solid extracts, which can be more easily exported. It is estimated that

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(1) "Mangrove bark", giving the commercial tannin product is formed with the bark of the following trees: *Avicennia officinalis* L., the white Mangrove; *Brugniera gymnorhiza*, the "Palétuvier" of the French; *Ceriops Candolleana*, Arnott, the Black Mangrove; *Kandelia Rheedii*, Wand A.; *Rhizophora mucronata*, Lamk., the true Mangrove. See: GEO WATT. The Economic Products of India. BEAUVERIE, — Le Bois, etc. [*Ed.*].

240 tons of bark will produce 45 per cent of cutch. It is said that Queensland is in a position to compete, under favourable conditions, with the principal sources of mangrove, that is to say, the east coast of Africa, North Borneo, etc.

DUBARD and EBERHARDT. **Erythrina Indica, Lamk. in Indo-China.**— (L'*Erythrina indica*, Lamk. en Indochine). — *L'Agriculture pratique des Pays chauds*, N. 94, pp. 62-67. Paris, janvier, 1911. **872**

Indo-China

The *Erythrina indica*, Lamk (1) grows in almost every part of Indo-China; the natives of Annam call it *Cayvong*. It is a fine, branching tree, reaching a height of 17 to 23 metres. It flowers once a year, from the end of February to the middle of March. In Annam and Tonkin the young leaves are used as food; they are eaten raw, with meat. The seed, which seldom ripens, being devoured by birds, insects and caterpillars, is considered by the natives as a valuable remedy against serpent bites. The wood is too coarse in grain for fine work and is much used, on account of its extreme lightness, in the manufacture of the native wooden shoes, which cost about 0.55 fr. the pair.

Owing to its light specific weight, this wood can be used instead of cork, being moreover permeable to air. Messrs. Dubard and Eberhardt have initiated experiments in the Professional School at Hué (Annam) for using this wood in making pith helmets, instead of the *Æschynomene* which is not sufficiently common in Indo-China to keep up a constant supply for manufacture.

The Areca Palm in Ceylon. - - *The Tropical Agriculturist*. p. 25. Colombo, January, 1911. **873**

Ceylon

There are two species of *Areca* native in Ceylon, *A. catechu*, L. and *A. concinna*, Thw. The former is cultivated extensively the latter is rather rare in the moist low country. It is rarely planted, but the fruit of the wild tree is chewed with betel like that of *A. catechu*. *Areca catechu* forms a tree 40 to 80 feet high and 8 to 16 inches in diameter, marked with ring scars of old leaves. The fruit is orange or scarlet. It is difficult to estimate the area devoted to the cultivation of this palm in Ceylon. Probably if all the scattered palms were put together at regular distances apart, they would cover say 40 000 or 50 000 acres. Hilly or low land suits them equally well and Arecas are often planted along the boundaries of land under hill paddy, cassava, or sweet potatoes.

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(1) A Leguminosa, of which two species, *E. indica* and *E. aspera* are mentioned by Sir GEORGE WATT, in *The Commercial Products of India* (London, 1908) as used in India instead of cork in the making of sun helmets, life-belts etc., and also together with bamboo in making mats. The bark is used in dyeing, tanning and medicinally. [*Ed.*]

Three varieties are commonly grown · *Sinhala, Rata* and *Hamban*. In India the Areca Palm is mainly found around the coast, and not far inland, except in Assam.

In Bengal, for instance, it is often put in groves of *Erythrina Indica*, which being a leguminous plant, enriches as well as shades the soil. The *Erythrina* is planted out as cuttings 6 feet long in rows about 12-15 feet apart. The betel nut trees, or *Areca catechu*, after being in nursery for about two years, are planted equi-distant between the *Erythrina*, and when these have come into bearing the *Erythrina* are cut down and a second lot of *Areca* planted in their places (1).

Coco-nuts are also often planted among them.

874 **The Outlook for Rubber.** — *Journal of the Royal Society of Arts.* p. 413. London, March, 3, 1911.

America According to the chairman of a rubber company, the present area under cultivated rubber in the Middle East is of about 730 000 acres.

Taking 300 lbs. per acre as a fair estimate of the average production, this area is capable of producing, when in full bearing about 100 000 tons of rubber per annum. But of course this maximum would not be reached, since it implies the highest possible cultivation and first-rate management throughout. Last year the Middle East produced about 8000 tons of rubber. This year, Mr. Lampard estimates the available supply at 15 000 tons of rubber; next year about 25 000 tons, in 1913 about 45 000 tons, in 1914 about 70 000 tons, and in 1915 about 100 000 tons.

The estimate of the consumption for 1909-10 is 100 000 tons, of which South America supplied 40 000 tons, the Middle East 8000 tons and the remainder of the world 52 000 tons. The ratio of increase in the consumption of rubber during the last few years has exceeded 10 per cent., and basing the calculation on this, and taking the world's consumption to-day at 100 000 tons, in 1915 the world will require 146 000 tons.

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(1) For *Erythrina*, see preceding paragraph.

Cultivated rubber can be produced at a very much lower price in the Middle East than that at which it can be collected outside it.

G. E. MATTEI. **A Sicilian Rubber Plant.** (Una pianta a caoutchouc indigena, *Atractylis gummifera*). — *Il Naturalista siciliano*, Vol. XXI, (Nuova serie), N. 1-8, pp. 146-160. Palermo, 1909-1910. **875**

Italy Sicily

Atractylis gummifera is a Composita, found over almost all the Mediterranean region, and very common in Sicily in open, rocky, dry, sunny situations (1). This plant contains a great quantity of rubber and might be used industrially. Analyses made with this view show that this plant, hitherto considered poisonous in Sicily, produces a latex containing from 22.9 to 36.46 % of rubber

After pointing out that the best time for collecting the rubber would be in June and July, shortly before flowering, the writer indicates two methods for extraction.

1) The collection of the rubber as fast as it is secreted, by means of incisions made near the inflorescence by hand, or, as is seen in Sicily, by an insect of the group of the Curculionidae, *Larinus buccinator*, Oliv. The writer thinks that in localities where the *Atractylis* abounds an experienced workman might collect in a day several kilograms of raw rubber, quoted on the Paris market at 2 frs. the kg., but which might be worth still more if properly purified on the spot ;

2) Extraction of rubber from the whole plant, with exception of the roots, the digging up of which would be too costly, and which, if left in the soil, would ensure a supply for future years. With mechanical treatment, principally, of the stems cut off at the base, of the leaves, and the inflorescence, the writer thinks that a very

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(1) This plant, common in Algeria, and in Crete, etc. where it seems to be indigenous, has a large tap root with a perfume like that of violets and possessing acrid narcotic properties which render it very poisonous. DUJARDIN BEAUMETZ et EGASSE, *Les Plantes médicinales*, Paris, 1889. [*Ed.*].

much higher proportion of rubber might be obtained, without affecting future production.

Mr. Mattei further proposes to cultivate the *Atractylis* either from cuttings from adult plants or, better still, from seed.

876 **A Large Rubber Plantation.** — *Bulletin of the Pan-American Union.* p. 169. Washington, Jan., 1911,

Mexico

The *Economista Mexicano,* one of the most influential financial publications of the Republic, is responsible for the statement that the Zacualpa Rubber Plantation is one of the largest, if not the largest, in the world.

There are 10 000 000 rubber trees, on this estate, which includes the various annexes located in the Soconusco District, State of Chiapas, and measures 23 miles, from one end to the other.

The hacienda in question is in itself a small town, with electric light, schools, and other public services. The Pan-American Railroad crosses the entire length of the plantation.

877 E. REBOUL. **Rubber Planting in Martinique.** (Les plantations d'essences à Caoutchouc à la Martinique). - *L'Agriculture pratique des Pays chauds.* N. 95, pp. 95-101. Paris, février, 1911.

Martinique

The Administration of Martinique has granted a subvention to the rubber plantations of Balata and La Tracée, in order to make a cultural and technological study of the three principal rubber-yielding trees. This study has led to the conclusion that the *Hevea* is too subject to parasitic diseases to thrive well in Martinique.

The *Castilloa* is sufficiently robust, and its vegetation is as rapid as that of the *Funtumia,* but it is more delicate and not likely to do well in Martinique, where a hardy variety is wanted, not only as a rubber producer but also as a forest tree. The *Funtumia,* particularly the *F. elastica,* answers to these requirements.

In Martinique plantations are formed in two ways: 1. on cleared land where the tree can develop freely; 2. in woods, where it grows under cover of forest trees.

An experiment dealing with 1100 trees shows that *F. elastica* is essentially a forest tree, and that the Administration and private individuals would do well to introduce this tree into their forests, where it will fill the gaps, and develop in the best cultural conditions. The hardiness of this tree and the minimum cost of its cultivation would make it profitable even if its yield in rubber were inferior to that of less robust varieties. Studied from a technical point of view, the rubber from *Funtumia* is found to be superior to that of *Castilloa* and inferior to *Hevea*, but this is compensated for by its hardiness and its resistance to disease.

The first results of these researches in the field and in the laboratory would recommend the *Funtumia* for Martinique.

Rubber from the West Indies and British Guiana. — *The Agricultural News*; N. 228, p. 31. Barbados. Jan. 2, 1911. 878

Tobago. St. Lucia Dominica British Guiana.

At the Imperial Institute, in London, specimens of rubber from Tobago, St. Lucia and Dominica have been examined.

Castilloa elastica from Tobago would sell well and realize a higher price if it could be prepared lighter in colour. *Castilloa elastica* from St. Lucia is almost black, but is clean, well prepared and of good quality. The amount of resin is rather high, but this defect may possibly disappear as the trees become older. The rubber of Dominica compared favourably with plantation Para rubber from the East, and there is no doubt that the Para tree will furnish excellent rubber in Dominica.

Lapium Jenmani rubber of British Guiana is of excellent quality and, if carefully prepared, will realize very satisfactory prices.

Rubber Conditions in Peru. — *The India Rubber World*. p. 154, February 1, 1911, New-York. 879

Peru

The Government of Peru is seeking by a liberal policy to encourage the cultivation of rubber trees. A law has been approved under which the Government will pay a premium equivalent to about 1 shilling for each rubber tree grown on a plantation, when it has reached the age of 3 years. It is asserted that under the favourable conditions which exist throughout the Peruvian "montaña", capital carefully invested there in rubber planting has practically a Government guarantee of repayment at the end of three or four years, while the investor would have his plantation as clear profit.

Thus far, however, little foreign capital has been so employed. It is stated that all the companies have made substantial profits.

880 **The Cultivation of Rubber in Bolivia.** — *Bulletin of the Pan-American Union*, p. 143. Washington, Jan. 1911..

Bolivia: Acre Territory

Next to tin, the most important product of Bolivia is rubber, the annual export value of which is estimated at 4 000 000 dollars. The exploitation of rubber lands is regulated by law through a tax of 1 boliviano yearly. (1). The principal areas lie on the north-east, near the Peruvian boundary; in the east, in the provinces of Santa Cruz and Azero, and in the Acre and Beni territory, which is exceptionally rich in its yield.

The Acre is watered by several large rivers originating in the Cordillera, and flowing into the Amazon. Those rivers are the Beni, Madre de Dios, the Orton, and the Acre. The capital, Puerto Acre, is connected by water with the important Brazilian commercial town of Manaos.

There are about 25 000 Europeans, Brazilians and Asiatics in the Acre.

Two varieties of rubber plant are found in this Territory, the Caucho, which has to be cut down in order to extract the sap, and the Hevea, which is merely tapped. In some cases the trees are tapped for a period of two years, and are then rested for a similar term. Other rubber trees are tapped for six years at a time and then left untouched for a like period. The trees selected for tapping in the Acre are usually from thirty to forty years of age, and are expected to yield for 20 years, after which they become useless.

881 **To Promote Rubber Culture in Brazil.** — *Bulletin of the Pan-American Union*. p. 346. Washington, February, 1911.

Brazil

A bill has recently been submitted to the Chamber of Deputies of Brazil authorizing the Executive to grant special concessions to national or foreign companies engaging in the cultivation and extraction of rubber, preferably in the Amazon Valley. The bill provides for the following bounties: A 5 per cent guarantee of interest on a capitalization of £ 600 000 (15 150 000 francs) during the first 10 years; exemption from customs duties on all material imported by the company; free transportation of material and labourers imported for the plantations on all Government railway and navigation lines; a reduction of 50 per cent in the export tax levied on rubber produced in the Acre Territory. The company, on the other hand, must plant no less than 4 000 rubber trees per year.

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(1) The legal value of the boliviano is 2 frs. (Law of December 31, 1908, establishing the gold standard in Bolivia). *Economiste Européen*, N. 959, p. 668, Paris. [*Ed.*].

882

G. GIOVETTI. **Failure of "*Manihot Dichotoma*" and "*Pianhyensis*" in Portuguese West Africa.** (Echec cultural des Maniçobas de Badia et de Piauhy dans l'Afrique Occidentale portuguaise). - *Journal d' Agriculture tropicale*. N. 115, p. 27. Paris, janv. 1911.

Portuguese West Africa

The writer has found by experiments that the Maniçoba of Jéquié (*Manihot dichotoma*) cannot resist wind. The *Manihot pianhyensis* does not give good results on poor soils; some grew to at most 3 or 4 feet in height during 2 years, while others did not measure even 0.60 m.

Of all the varieties of manihot for rubber producing, Mr. Giovetti has no hesitation in recommending *M. Glaziowi* as the best for planting, at any rate in Portuguese West Africa.

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Rubber from "*Mascarenhasia Elastica*". — *Bulletin of the Imperial Institute*, Vol. VIII, No. 4, pp. 346-352. London, 1910.

British East Africa Protectorate. German E. Africa. Pemba Portuguese E. Africa.

In 1908 a new rubber-yielding tree was discovered by Dr. Stuhlmann in the neighborhood of Dar-es-Salaam, German East Africa, and was determined by Dr. K. Schumann as a new species of *Mascarenhasia*, to which the name *Mascarenhasia elastica* was given. After its discovery in German East Africa, *Mascarenhasia elastica* was found in the East Africa Protectorate, the island of Pemba, and Portuguese East Africa. The discovery of *Mascarenhasia elastica* in the East Africa Protectorate was made in 1906 by Mr. E. Battiscombe. The tree is indigenous in parts of the forests of the Shimba Hills, to the south-west of Mombasa, and, as in German

East Africa, it is usually found on the banks of streams or in moist situations. It there grows to a height of about 40 feet (12.19 metres), and the trunks, which attain a diameter of about 18 inches (46 cm), branch about 20 feet (6.09 metres) from the ground. The old trees have a thick, scaly bark, which can be easily removed; the inner bark is about ¼ inch (6 millimetres) thick and can be easily cut, but the latex exudes slowly.

Samples of the rubber from *Mascarenhasia elastica* were examined at the Imperial Institute, in London. The percentage composition of dry rubber is given in the following table:

	Caoutchouc	Resin	Proteid	Insoluble	Ash
Rubber from East Africa Protectorate	70.6	6.8	3.9	12.7	2.51
» » Pemba	85.2	9.0	3.7	2.1	1.29
» » Portuguese East Africa:					
a) Ball rubber (average of 2 analyses)	80.4	5.5	3	5	2.7
b) Smoked Sheet Rubber (average of 3 analyses)	81.2	7.6	3.8	7.3	1.9

The results of the examination of these specimens of *Mascarenhasia elastica* rubber show that the product is of good quality if carefully collected. Experiments are in progress to determine the probable value of the plant as a source of rubber.

884

G. VERNET. **Positions and Frequency of the Incisions on Hevea.** (Disposition et rapprochement des incisions sur l'*Hevea*). *Journ. d'Agriculture tropicale*, N. 116, pp. 40-45. Paris, février 1911.

Indo China

Mr. Vernet passes in critical review the notions at present controlling the position and relative proximity of the incisions made in the *Hevea*. He would abandon the usual methods of spiral cuts, single or double fishbone cuts round the half or the quarter of the trunk, and insists on the advantages of the half fishbone on $^1/_5$ of the circumference, and especially of a system of punctures made in a spiral channel, which he has employed for the last five years at Suoi-Giao.

Coagulation of Rubber Latex in Different Countries. (I differenti metodi di coagulazione del latice. — *L'Agricoltura coloniale*, Anno V, N. 2, p. 74. Firenze, febbraio, 1911. 885

Coagulation Process.	Countries.
I. Chemical process:	
1. Mineral acids and mineral agents	Gambia, Senegal, Sudan, Mozambique, Brazil, New Caledonia.
2. Organic acid and plant juices	Ceylon, Sudan, Gambia, Madagascar, Upper Congo, German East Africa.
II. Mechanical processes	Mexico (Guayule).
III. Crushing and steeping the vegetable residues	West Africa, Congo, German East Africa, Mexico.
IV. Skimming:	
1. By adding water, draining, washing, compressing	Congo.
2. Mechanical skimming, combined with coagulation by acids	Ceylon.
V. By heat:	
1. Dry or smoke. 2. Damp	Brazil, New Caledonia, Mexico
VI. Evaporation and sun heat:	
1. Sun heat	Angola.
2. By contact with the human body	Congo, Angola.
3. Evaporation in shallow pans	Ceara, Angola, Ivory Coast.

Gums from Northern Nigeria. — *Bulletin of the Imperial Institute.* Vol. VIII, N. 4, pp. 352-365. London, 1910. 886

British West Africa: Northern Nigeria

The gum from Northern Nigeria, particularly from the Bornu and Yola provinces, is derived for the most part from trees of the same species as those yielding the Sudan and Senegal gums, which constitute the bulk of the gum imported to Europe. Samples of gums collected from some of the chief gum-yielding trees of the Bornu, Yola and Sokoto provinces have been examined chemically at the Imperial Institute, South Kensington. The species were determined at Kew.

Botanical Sources of Nigerian Gums. Acacia Senegal, a grey-barked Acacia, abundant enough in the Northern Provinces, though even there it is rarely more than a shrub or small tree; *Acacia Sieberiana,* a large tree with a spreading crown of large foliage; *Acacia Suma,* a tall tree abundant in the north, and also on the Bornu road from Yola to Song; *Acacia Seyal,* a shrub or small tree; *Acacia xanthophloea,* with the characteristic yellow or ochreous powder on the bark; *Acacia arabica.*

Occasionally the less soluble gums from one or two species of *Albizzia*, which are nearly as common in these provinces as the Acacia, may be mixed with samples of the better varieties.

Gums are also derived from: *Combretum leonense; Combretum verticillatum; Combretum Hartmannianum; Varamus exanthematicus; Anogeistus leiocarpa; Sterculia tomentosa.* Two other species yield gum which is not collected by the natives: one of these was found at Kew to be a new species and has been named *Cussonia nigerica;* the other is *Haematostaphis Barteri*, a tree of about 15 to 20 feet (5 to 6.70 metres) with edible fruit. *Pterocarpus erinaceus*, although yielding gum, is chiefly esteemed by the natives for its excellent timber.

Daniella thurifera is not now tapped for its oleo-resin. The resins of *Boswellia Dalziellii*, *Boswellia odorata* (two new species determined at Kew), and the very fragrant tuber of a species of *Juncus* are used as frankincense. For this purpose these plants are abundantly cultivated in Bornu. The shrub *Balsamodendron africanum* has a similar use, but in this case the whole bark is powdered and burnt.

In the chief gum-collecting centres the same species of Acacia often occurs alone over wide areas, so that it is not impossible, in Bornu at least, to ensure that the gum collected is almost entirely from a single species, thus avoiding variability. The following table shows the variation in gums from different species:

Source of gum	Moisture per cent.	Ash per cent.	Matter insoluble in water per cent.	Strength measured by viscosity	Colour of mucilage
BORNU PROVINCE					
Acacia Senegal	10.21to11.18	2.87 to 3.17	1.20 to 1.91	5.36 to 6.66	Almost colourless to pale brown.
Acacia Seyal	11.19to11.42	2.50 to 2.66	0.81 to 1.11	5.86 to 6.66	Brown.
YOLA PROVINCE.					
Acacia Suma	13.32to13.56	2.00 to 2.36	1.10 to 1.50	11.1 to 16.7	Colourless to brown
Acacia Siberiana	13.63	2.65	0.76	13.3	Pale coloured.
SOKOTO PROVINCE					
Combretum sp.	12.09	2,0	1.2	7.8	Dark brown.

J. C. OAKENFULL. **Uses of *Copernicia cerifera*** — *Brazil in* 1910, 2nd 129. Dewsport, 1910. **887**

« Carnaubeira » (*Copernicia cerifera*, MART.) is found as far south as Bahia and grows sparsely in the more temperate parts of Brazil, thriving best in hot, dry situations. The roots are useful in skin diseases and depuratives, the leaves make excellent cordage and twine and are commonly employed to stuff mattresses ; the fruit is agreeable and nutritious ; the timber makes fine furniture ; the young shoots are the palmito or cabbage palm ; the sap of the adult palm contains a very wholesome kind of tapioca and makes a pleasant fermented drink, whilst even the stalks and other residues furnish food for cattle. **Brazil**

The principal product of the tree is, however, the vegetable wax which is found in the young leáves. 100 leaves from one tree give about 4 lbs. (1.812 kg.) of wax on an average, but under good conditions, as much as 13 lbs. (5.889 kg.) has been obtained. The exportation of this wax in 1905 was valued at £ 200 000 (5 050 000 francs).

ED. ZACHAREWICZ. **Experiments with Fertilisers in Truffle Culture.** (Expériences sur les engrais chimiques appliqués à la culture truffière). — *Revue de Viticulture*. N. 896, pp. 204-206. Paris, 16 févr. 1911. **888**

As the giving of any kind of organic manure stops the production of truffles, the writer has tried the use of chemical fertilisers, in order to prevent the deterioration of the intermediate crops for want of manure. These experiments, extending over 2 years, have given excellent results, and have shown : **France**

1) That mineral fertilisers, unlike organic manures, can be applied with advantage to the cultivation of truffles ;

2) That acomplete fertiliser, composed of sodium nitrate, potassium chloride and superphosphate, has an excellent effect on the yield ;

3) That the fertilisers in no way diminished the qualities of size, shape or aroma of the truffles ;

4) That the association of the culture of the vine with that of truffles may be well maintained by the application of mineral fertilisers ;

5) That there is nothing to prevent the establishment of truffle beds in vineyards already planted and manured yearly with mineral fertilisers.

Live stock Breeding. — Aviculture. Beekeeping. — Silk-Production. — Animal Industries.

889 S. S. Buckley. **Tuberculosis in Animals.** — (Maryland Sta. Bul. 145, p. 267-314). *Experiment Station Record*, N. 7 p. 684. Washington, December 1910,

United States : Maryland

In this Bulletin the writer discusses the many phases of the tuberculosis problem, reviewing the present state of knowledge of the disease and the methods of combating it.

Tests were made to determine the effect of vaccination upon young calves and the extent of immunity conferred. These tests demonstrated that young calves vaccinated early in life had sufficient immunity conferred to enable them to resist a degree of infection sufficiently severe to cause pronounced disease in untreated calves, when this exposure was incurred during the first year of life. The second test demonstrated that after 2 years the vaccinated animals failed to offer greater resistance to infection than was possessed by an untreated animal. The series of vaccinations showed the harmlessness of the treatment as far as the animals themselves are concerned, since no bad results were observed in a total of 148 vaccinations or 74 completed immunizations. The writer considers immunization to be a justifiable procedure, but thinks that it should for the present at least be under the censorship of a proper State Board, in order that late vaccination, early breeding and association with cows in milk be not permitted. It is pointed out that in selective breeding, with an increased capacity in production as the principal object, the chest development has been a secondary consideration. Since this practice has tended to develop a more delicate type of cattle and to lessen the chest capacity, the aim in breeding must now be directed toward its correction. A system of stabling combined with exercise, fresh air, and changing temperatures, which will tend to overcome this evil, is advocated.

890 Winkler. **The Milk of Cows suffering from Foot-and Mouth-Disease.** — (Die Milch der an Maul und Klauenseuche erkrankten Kühe). — *Oesterreichische Molkerei-Zeitung*, Wien, 1 Jan. 1911.

Austria

Mr. Winkler has examined 20 samples of milk from various cows suffering from this disease, and also mixtures of milk from infected cows, taken during various phases of the disease. His own studies and the literature on the subject have led him to the following conclusions:

1) *Power of infection:* According to Nocard's investigations, milk which has been milked with care after the udders of the cows have been disinfected is not infections, and does not become so unless it is mixed with the pus from the vesicles of the udder. According to Bircher's observatious, however, the milk might be infectious even after the ulcers are healed. The infectious character is destroyed by boiling or by heating up to 85° C. for one minute, 87° C. for three minutes, 75° C. for fifteen minutes or even 70° C. for twenty-five minutes. According to Ebertz, the infectious character is also destroyed by the natural acidification of the milk.

2) *Aspect of the milk.* The milk of cows which are seriously affected by foot and mouth disease is more or less yellow and viscous, and it forms a nauseous, yellowish-gray deposit, of a bitter and rancid taste More frequently, however, it is poor, bluish and deficient in butter fat In slight cases it is difficult to distinguish the milk from that of sound cows. The butter fat separates rapidly, and the remaining milk has a very watery aspect.

3) *Composition.* The proportion of butter fat generally increases at the beginning of the infection, whereas during convalescence it decreases considerably. The specific weight is often very low (1.0234). The quantity of casein decreases as a rule, while the salts, albumen and globulin increase.

4) *Acidity.* More particularly at the beginning of the infection, the degree of acidity sinks (6 degrees Soxhlet-Henke) while as a rule it increases during convalescence (up to 10.3 degrees).

5) *Aspect under microscopic examination.* The plasma of the milk is generally granular, and in convalescent cows the granules of casein are very large.

The fat globules are round and much larger than usual; they often form clusters with the epithelial cells. In cows which are recovering, the small globules frequently predominate. The epithelial cells are plentiful, and are frequently in a state of incipient decomposition. The colostrum cells are also numerous and varied in form. The number of leucocytes is limited, and there are often solid amyloidal globules. The microscope clearly reveals a pathological secretion of milk. The reconstitution of the epithelial cells would explain why the production of milk and of fatty matters is weaker, even after the period of recovery.

Mr. Winkler concludes by saying that even the milk which is least altered by the infection, ought never to be used for the manufacture of butter and cheese, on account of the alterations which would be caused in the products.

891 EUGEN SEEL. **Comparative Analyses of Milk From Cows Suffering from Mastitis.** (Vergleichende Untersuchungen der Milch bei Euterentzundungen der Kühe).—*Zeitschrift für Untersuchungen der Nahrungs und Genussmittel*, Heft 3, 31 Bd, Seiten 129-168, Berlin, Feb. 1. 1911.

Germany

The appearance and composition of the milk from cows suffering from mastitis are very different from those of ordinary milk.

During the first days of the disease, the milk secreted by the organ affected has the appearance of a watery serum, generally yellow and flaky, but during the recovery period it gradually assumes the appearance of ordinary milk, while the bacteria that are the cause of the disease disappear.

The specific weight is nearly always less than normal, but in the mixture of milk from the four teats, the difference is reduced to a minimum and is not of such a nature as to constitute the means for diagnosing a beginning of mastitis.

The reaction of the secretion is always alkaline, and this fact may be taken as a better test than the specific weight for the recognition of the beginning of mastitis, and the more so as the milk from an unaffected part of the udder is only slightly alkaline. The dry matter is considerably less during the disease and only returns to the normal quantity during recovery. The quantity of sugar of milk decreases very much in the first period of the disease, and increases slowly again until it has become normal after the animal is well. The proportion of butter fat also decreases greatly, while the content in albumen increases continually and to a considerable extent, so that this determination is quite sufficient to diagnose the disease from the beginning. This is not the case in the determination of other albuminoid matters of milk, such as casein and globulin, which undergo but slight alterations. Only a slight variation is observed in the quantity of ash, which has a considerable decrease of chlorides.

Taking these experimental data as a basis, it may be concluded that when a milk gives an alkaline reaction, a weak proportion of chlorides in the ash, an excessive quantity of albumen, and in certain cases also a variation in the index of refraction of the butter fat, it ought to be considered as produced by cows suffering from mastitis.

Further investigations are necessary in order to determine the limits within which a beginning of mastitis may be shown by analysis

F. H. A. MARSHALL AND W. R. PEEL. **Fatness as a Cause of Sterility. in Heifers.** — *The Jour. of Agric. Science.* Vol. III, Part. 4, pp. 382-389. Cambridge, December 1910. **892**

Great Britain

It was the object of the investigation described by the writers to obtain information regarding the probable causes of sterility in fat animals and more particularly in fat heifers. For this purpose the generative organs were obtained from a number of newly killed animals which were for the most part in the condition described by the butchers as « fat-ripe » and were often known to have been sterile for some time before killing. The general conclusions reached are that the derangement of the oestrous cycle in fat animals is caused by a disturbance of the ovarian metabolism as manifested especially by a considerable deposition of pigmented fat or lipochrome in the interstitial tissue, and that this process is accompanied by an unusually extensive degeneration of follicles which may lead to a prolonged state of sterility. However, since the degeneration does not usually occur to any especially great extent in the smaller or less mature follicles, it may be inferred that the sterility so induced is commonly of a transient nature, and can be remedied sooner or later by a reduction in the quantity of food supplied or by an increase in the amount of exercise. And this conclusion appears to accord with the results of actual practice.

F. TANGL AND A. ZAITSCHEK. **Influence of Watery Food on the Composition and Quantity of Milk.** (Ueber den Einfluss verschiedener wässriger Futtermittel auf die Menge und Zusammensetzung der Milch und des Milchfettes). — *Die Landwirtschaftlichen Versuchs-Stationen*, Band LXXIV, Heft III-V, pp. 183-262, Berlin, Feb. 13, 1911. **893**

Hungary

The experiments made by the Royal Station of Animal Physiology at Budapesth give a new contribution to the much-discussed question of the indirect increase of the quantity of water in milk through the feeding.

The following quantities of foods, containing a large proportion of water, were given per 1000 kg. of live weight, to 10 cows without the slightest inconvenience in their general state being observed :

Starch factory residues	89 kg.
Pumpkin pulp	133 »
Turnips	82 »
Potatoes	31 »
Lucerne	76 »

During the period of both watery and dry feeding, the cows received a plentiful quantity of albuminoid matter, and starch equivalents (Kellner). The live weight of each cow increased on an average by 0.55 kg. per day during the period of watery feeding, and 0.60 kg. per day during the period of dry feeding.

The increase in the secretion of milk was accompanied by a considerable increase of all the components of the milk, with the exception of the sugar of milk, the quantity of which remained practically constant. The albuminoids and the fat increased more rapidly than the mineral components of the milk (ash).

There was an average yield of 55 % of milk per day in the morning, and 45 % in the evening, but the evening milk always contained 1. 1 % more butter fat.

In the average composition of the milk, there was no difference between that given by a watery diet and that by a dry one, so that the assertion that watery food gives a poorer milk than dry food must be considered as inexact. The greater quantity of water taken with the food has no influence on either the quality or quantity of the milk. The quality of the various watery foods has, however, an action on the quantity of milk ; starch factory residues, turnips and lucerne increase the quantity, potatoes slightly diminish it, and the pulp of pumpkins diminishes it considerably.

The production of milk depends not only on the quantity of digestive nutritive substances and the starch equivalents absorbed, but also on the quality of the foods.

Zaitschek also investigated the composition of the butter fat of milk obtained by feeding with watery and with dry food basis. He found that the composition of the fat was practically the same during the two periods, in spite of the great difference of the foods used. The analysis values found are in fact easily within the limits met with in ordinary milk, which are the following, according to Barthel .

Melting point, 28° to 36° C.
Refraction Index at 40° C. 40.5 to 45 (47).
Index of Reichert-Meissl (19) 24 to 34.
Index of Köttsdorf 220.5 to 232.
Index of iodine (Hübl.) 25.7 to 49.

The following table gives the average figures of the analysis for the different foods used ·

	Index Kottsdorf	Index Reich.-Meissl	Iodine Index	Refraction Index	Melting Pt.
Dry Fodder I	213.5	19.5	43.9	45.7	30.9-32.3
» II	222.8	24.3	36 3	44.2	32.8-33.8
Turnips.	230.1	26.0	33.1	42.8	29.8-31.1
Potatoes	222.7	22.5	35.2	44.2	32.0-33.5
Lucerne	222.7	23.4	40.0	44.7	32.3-33.3

Considering the composition of the foods used during his experiments, the writer draws the following conclusions from these data:

The food rich in fats with a high iodine index increased the iodine index in the milk, while it decreased Köttsdorf's and Reichert- Meissl's indices. Feeding with turnips increased the quantity of volatile acids in comparison with a rich ration of concentrated foods, especially of maize and colza oil cake. The action of potatoes was the same.

Although the fats contained in the foods had an influence on the composition of the butter fat of the milk, differently constituted rations may still produce a fat with the same composition, since the different fats of the various foods complete each other.

Towards the end of a lactation, Reichert Meissl's index and the index of saponification decrease, while the indices of refraction and of iodine and the meltlng point increase. After a change in the alimentary regime, the saponification and iodine indices reach their final value more readily than Reichert-Meissl's index.

894 GUSTAV FINGERLING. **New Investigations on the Influence of Stimulants on the Secretion of Milk.** (Weitere Untersuchungen ueber den Einfluss von Reizstoffen auf die Milchsekretion) - *Die Landwirtschaftlichen Versuchs-Stationen.* - Bd. LXXIV, Heft III-V, pp. 163-182, Berlin, Feb. 13, 1911.

Germany

In continuation of his preceding investigations and communications, Mr. Fingerling gives an account of his recent experiments on the influence that may be exercised on the secretion of milk by the stimulating substances contained in molasses. Molasses contain substances which, independently of their nutritive value, may exercise a stimulating action on the lacteal secretion. This specific action, apart from the production value of the food, is greater the more insipid the forage or food fo which the molasses have been added.

On the other hand, this specific action of molasses on the milk secreting glands is no greater than that of other foods rich in aromatic or pleasant tasting nutritive substances.

Besides other substances already studied from this point of view, such as brown meadow hay, kitchen salt and concentrated foods rich in exciting substances, the farmer may therefore add molasses to insipid and tasteless fodders and so make them more acceptable to cattle, at the same time doing away with the necessity for the stimulating powders which are sold to increase the production of milk and for fattening, and whose nutritive value is rarely in proportion to their cost.

895 **Feeding Pigs with Cooked and Uncooked Potatoes.** — *The Journal of the Board of Agriculture.* p. 925, London, February 1911, N. 11.

Great Britain: Wales

This was a continuation — in the University College of Wales — of two experiments comparing cooked and uncooked potatoes for pig feeding, which had shown that the trouble and expense of cooking were not on the whole justified by the slightly better results from feeding cooked potatoes. In this case three pigs (large Yorkshire-Berkshire cross) were given daily 2 ½ lb. barley meal and 3 ½ lb. boiled potatoes, and three other pigs the same quantities but with the potatoes raw. This feeding lasted six weeks. The potatoes given to Lot I, were boiled at the beginning of each week, and were supplied cold. The potatoes for Lot II were pulped after being thoroughly washed.

The potatoes and meal were mixed with water and then supplied to the pigs, the same quantity of water being used in each case. The three pigs fed on raw potatoes made a gain in live-weight of 1 cwt 73 lb., while the three on boiled potatoes made 1 cwt 98 lb.

If 1 s. per week is allowed as the cost for fuel and labour in boiling, the balance in favour of the boiled potatoes is estimated at 2s. 6d. but Professor Bryner Jones remarks that the trouble and inconvenience of cooking food for pigs is, in many cases, a much more serious consideration than the actual cost of fuel and attendance allowing for which, it is doubtful whether it would not frequently be found much more profitable to feed pigs on raw potatoes than this experiment would seem to show.

LEON BUSSARD. **Colouring Colza Oil-cakes.** — *Annales des Falsifications* — Année IV, N. 28, pp. 75-77, Paris-Genève, Feb., 1911. **896**

France

Carbonate of soda in the proportion of from 0,75 % to 1 % is added to the Indian colza oilcake to give it a green tint, the brown colza oilcakes not being so highly esteemed by the trade.

This practice, which is not injurious in itself, and cannot be easily discovered except by microscopical analysis must nevertheless be considered an adulteration.

By colouring the Indian colza oilcake green, that is, by giving it the characteristic appearance of the well made European colza oil-cake, merchants are enabled to sell the Indian for the European, which constitutes a deception as to the nature, origin and substantial qualities of this food stuff.

The Indian colzas comprise *Brassica juncea, Sinapis dichotoma, Sinapis glauca, Eruca sativa, etc.,* while the European colza is *Brassica oleracea.*

897 J. SANARENS. **The Fats of Animals Fed on Cotton Flour.** – *Annales des Falsifications*, IV année N. 28, pp. 72-75, Paris-Genève, Mars 1911.

France Mr. Sanarens' experiments and analyses show that the fats of animals fed on cotton give the Halphen reaction, *very clear pink*, which might suggest a fraud (1). But the investigations also showed that the intensity of the reaction is comparable and inferior to that of a fat to which 4.5 % of cotton seed oil has been added, that the reaction to nitrate of silver is nil with the fatty acids and that the constant indices are very little modified.

898 LEON BUSSARD. **Adulteration of Linsed Meal and Oil Cake.** *Annales des Falsifications*, IV année, N. 27, pp. 30-31, Paris-Genève, janv. 1911.

Belgium The greatest number of frauds in connection with concentrated foods for animals are perpetrated with linseed oil-cakes, on account of their high price, and the favour in which they are held by farmers.

Some examinations which have been made in the laboratories of Antwerp, Gand, Liège and Louvain have shown that the trade of adulterated oil - cakes and meals for cattle is in a flourishing condition. The adulteration mainly consists in the addition of rice or cotton meal, ground-nut bran, rice husks, cereal waste, inferior meal and lastly, linseed husks.

899 CARLO MANETTI. **Bamboo as Fodder and Litter.** (Le foglie di bambù considerate come foraggio e come lettiera). -- *L'Agricoltura Coloniale*, N. 1-2, pp. 22-32 and 62-71, Firenze, Genn.-Febb. 1911.

Italy: Tuscany Investigations made at Pisa on the nutritive value of bamboo leaves, samples of the *Bambusa mitis*, or *Phylostachis mitis*, Poiret, being used. The results showed that the fresh leaves of bamboo, chopped and mixed with concentrated foods such as oil-cakes and the residues of the milk industry, constitute a satisfactory nourishment, especially where other and better fodders are lacking.

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(1) The Halphen reaction is founded on the red colouration produced by the action of disulphide of carbon on cotton seed oil. In practice equal volumes of the oil to be tested, of amylic alcohol and of disulphide of carbon, containing 1 per cent of sulphur in solution, are used.

[*Ed.*].

Mr. Manetti's experiments gave more favourable results for the use of bamboo leaves as litter. Chemical analysis of the leaves shows some advantage over other vegetable litters, particularly as regards potash and phosphoric pentoxide; moreover, the absorbent power of the bamboo leaves is not inferior to that of good litters, and they keep very well, even after prolonged contact with the organic liquids of the stable. Bamboo litter has the further advantage of not soiling the animals' feet and of being much lighter than straw and other litters.

United States Regulations Governing the Certification of Recognized Breeds and Pure-bred Animals. — *U. S. Dep. of Agriculture: Bureau of Plant Industry.* Order 175. 900

Unite
State

Two regulations governing the "Certification of Pure-bred Animals" and the "Certification of Recognized Breeds" became effective in the United States on January 1, 1911, under authority of paragraph 492 of the Act of Congress approved August 5, 1909, entitled "An Act to provide revenue, equalize duties and encourage the industries of the United States, and for other purposes", which is as follows: "Any animal imported by a citizen of the United States, specially for breeding purposes, shall be admitted free, whether intended to be so used by the importer himself, or for sale for such purpose: *Provided*, that no such animal shall be admitted free unless pure-bred of a recognized breed, and duly registered in the book of record established for that breed: *And provided further*, that certificate of such record and of the pedigree of such animal shall be produced and submitted to the customs officer, duly authenticated by the proper custodian of such book of record, together with the affidavit of the owner, agent, or importer, that such animal is the dentical animal described in said certificate of record and pedigree: i*And provided further*, that the Secretary of Agriculture shall determine and certify to the Secretary of the Treasury what are recognized breeds and pure-bred animals under the provisions of this paragraph. The Secretary of the Treasury may prescribe such additional regulations as may be required for the strict enforcement of this provision.

Cattle, horses, sheep, or other domestic animals straying across the boundary line into any foreign country, or driven across such boundary line by the owner for temporary pasturage purposes only, together with their offspring, may be brought back to the United States within six months free of duty, under regulations to be prescribed by the Secretary of the Treasury: *And provided further*, that the provisions of this Act shall apply to all such animals as have been imported and are in quarantine or otherwise in the custody of Customs or other officers of the United States at the date of the passage of this Act ".

Regulation No. 2 contains a list of 10 books of record for breeds of horses; of 20 books of record for breeds of cattle; of 13 books of record for breeds of sheep and 3 for hogs; which are recognized breeds and books of record of foreign countries, across the seas. A list of the breeds recognized in the Canadian National Records is also given.

901 D. V. TEDOROV. **Horses and Oxen for Field Work, in Russia.** (Sravnitelnaia Vegodnosti Vola i Losciadi). — *Khosiaistvo* (*The Home*) G. VI, N. 4, pp. 120-123, Kiew, Jan, 27, 1911.

Russia

The bringing under cultivation of vast extents of land in Southern Russia which were formerly used for grazing, has once more drawn attention to the question of the advisability of using horses in farm work.

1) The cost of keeping a horse amounts to from 35 to 40 kopecks a day (1), as it must be fed with good hay and concentrated food. The keep of an ox is about half this amount, that is, from 15 to 18 kopecks.

2) The horse is more liable to disease than the ox and requires greater care and better attendance and stabling.

3) A horse cannot be put to work before its fourth year by which time the cost has run up to 300 roubles, while for the ox it never exceeds 70 roubles.

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(1) 100 kopecks = the silver rouble, worth 2*s* 1·6*d*.

Besides, an old ox, if in good condition, may be sold at a good price to the butcher, while the most that can be got for a useless horse is 40 roubles.

4) It cannot be denied, however, that the horse performs harrowing, sowing seeds, and light work in general, with much greater rapidity.

MENABEY. **Madagascar Oxen.** (Les boeufs Malgaches). *Revue de Madagascar,* 13e année, N. 2, pp. 658-668 Paris, Fév. 15, 1911. **902**

Madagas

The administration of this Colony furnishes some information on the cattle resources of the provinces of Majunga, Analalava and Tulear. The number of oxen in the province of Majunga is estimated at 300 000, and the Chamber of Commerce thinks that the exportation should not exceed 10 000 head for the two first of these provinces, while the chief of the province of Analalava calculates that, his province could export 30 000 head. Altogether it appears that 80 000 to 90 000 head of cattle could be exported from the three provinces.

A Company, much better than a private person, could devote a ship for this export service which might touch at the three ports of the three provinces, the concentration by land of all this cattle being pratically impossible.

The most propitious season for this trade is the cool season, from April to September. There is very little forage at this time, and it would be well to lay in a stock of it during the wet season, at the average price of 68 to 80 francs per ton.

A. R. **Milk-Production and Girth in Cows.** (Produzione lattea e circonferenza del torace nelle vacche). — *L'industria lattiera e zootecnica,* anno IX, N. 5, pp. 72-73, Reggio Emilia, Marzo 1, 1911. **903**

Italy: Emilia

Some data collected by the writer at the Zootechnical Institute of Reggio have been drawn up in a table giving the breed, age, number of gestations of the cows, their girth, milk performance and average live weight, calculated at the beginning of each month. The results show that the largest production corresponds to the largest girth and the heaviest live weight of the animal. This is in direct contradiction with current opinion, according to which a narrow chest is characteristic of a good milker.

904 VUILLET, AMMAN, MENIAUD. **Sheep-raising in French Sudan.** — *La Quinzaine Coloniale*, N. 4, p. 126, 25, Feb. 1911.

French West Africa: Sudan

France pays a continually increasing tribute abroad for the supply of the raw material for wool weaving factories.

West Africa seems likely to give the wool trade a considerable impetus. Sheep raising is practised there on a large scale, and especially in the middle Niger might be greatly developed and improved; in the Macina there are about 600 000 wool bearing sheep. In a general way, the sheep of the Sudan do not go far from the regions subject to the inundation of the Niger, and the fertile region of Macina is particularly well adapted to the raising of sheep for wool.

The sheep of the Sudan belong to the so-called Macina breed, which is very similar to the Merino. The colour varies from white to citrine white; the fleece descends to the knees and hocks, and the wool is from 15 to 25 cm. long. The weight of the fleece is not much more than 1.500 kg. Sheep are not found exclusively in Macina, and there are also other breeds in West Africa. A sheep of small build, with black and white fleece, is found extensively in Dahomey and the Fouta-Djalon. There is also a large Moorish breed, with a thick black fleece. The Peulhs raise a large breed, with a chestnut-coloured fleece, which has great powers of endurance.

The exploitation of the Sudan wool can only be made remunerative by the improvement of the conditions of production. It is with this object that a central sheep station has been established at Goubo, in the Issa-Ber region, for the production of rams. The first flock was formed by young thorough-bred rams carefully chosen. Vacancies are filled as fast as they occur, so that there is always a choice stud for reproduction. They are protected against the weather by sheds.

A certain number of natives have been attached to the sheep station as apprentice shepherds and shearers.

905 T. B. WOOD. **Sheep Breeding by Mendelian Methods.** *The Journal of the Board of Agriculture*. N. 11, London, February 1911. P. 925.

United Kingdom

In 1903 an experiment was begun by Professor R. D. Wood to follow out the inheritance of various characters in sheep. Suffolk ewes were crossed with a Dorset horn ram, these breeds being selected as possessing certain well-marked characteristics. Suffolk sheep of both sexes, black faces and no horns, and Dorsets of both sexes, with white faces and large horns. In order to simplify the experiment the face colour and horns alone were considered, all other characters being neglected. The experiment was of a preliminary nature. The purpose being to study the possibility of work on Mendelian lines with large animals, rather than to produce results of economic importance. The results were of considerable interest from this point of view, but indicate clearly the difficulty of experimental work with large and slow-breeding animals. The purity of males as regards Mendelian characters can be quickly tested by mating with a number of ewes, but it must be several years before a female bears enough lambs for it to be seen that she breeds true. Another difficulty is the complicated nature of what it was hoped would prove to be simple characters, such as horns and face colour. Points of economic importance such as would appeal to the butcher, the dealer or the wool merchant, are hardly likely to turn out less complicated than these.

CAUCURTE. **The Goats of Nedjed in Arabia.** (Les Caprins de Nedjed). — *Chasse et Pêche*, N. 22, p. 498, Bruxelles, 25 Fév. 1911. **906**

Arabia

The Arab goat of Nedjed, " Bous adeni, " (" Old woman " in Arabic) is met with throughout Arabia, and chiefly on the plain of Nedjed.It has a considerable resemblance to the Syrian goat. Goats generally in Nedjed are smaller than those of Syria; they are black in colour, or a dark mahogany black, the ears and nose being more or less white with black star-shaped spots, or black with white star-shaped spots All the goats are horned. The she-goat is a small milker, and her hair is used for the same purposes as that of the " samar " or Syrian goat.

Dairying in German South West Africa. — *Deutsches Kolonialblatt*, N. 24, p. 994, Berlin, Dec. 15, 1910. **907**

German S. W. Africa

Dairying only exists in the centre and north of the Colony, and even here neither the condensing nor sterilising systems are used, so that the butter cannot be sold at a distance of more than 80 kilometers. Cheese-making is not profitable in the Colony. The great obstacle to the development of dairying is insufficient communications. Some attempts at exporting butter to Germany have given fairly satisfactory results. The butter is packed in small wooden boxes, ventilated by means of many holes.

908 K. J. **A New Adulteration of Milk.** (Une falsification nouvelle du lait). — *Annales des Falsifications*, Année 4, N. 27, pp. 26-28 Paris-Genève, Jan. 1911.

Belgium

The adulteration, discovered in Belgium, consists in replacing a part of the butter of milk by coco butter.

Analysis of samples taken by Mr. Ledent of Liège has shown that the proportions of dry extract, mineral matters and casein, although not very different from the usual quantities, are too low relatively to the proportion of fatty matter.

A pure milk, with 3.70 % fat, never contains less than 11.50 % of dry extract, nor less than 0.65 % of mineral matters and 3.50 % of albuminoids. These ratios were not found in the samples of adulterated milk.

909 A. Dall'Aglio. **Butter from Ewes' Milk.** (Il burro di pecora). — *Il Caseificio Moderno,* Anno IV, N. 4, pp. 54-95, Piacenza, Feb. 15, 1911.

Italy: Sardinia

The Sardinian Zootechnical Institute of Cagliari has been making some experiments with "pecorino" whey, to experiment its utilisation in the manufacture of butter.

The experiments were made with the whey, and not with the whole milk, in order not to interfere with the established interests of the country, where sheep raising is very extensively carried on and the manufacture of "pecorino" constitutes the main cheese industry.

108 litres of whey gave 12.5 litres of cream, with which 4.350 kg. of butter were produced, or a yield per quintal of 4 kg., which sells at 8 fr.

This butter has not quite the consistence of butter from cows' milk and has a slightly different colour and flavour, but the taste is agreeable.

In Sardinia the whey is used to make " ricotta " which gives a maximum yield of 10 %, while the product is sold at 0.75 fr. per kg. There would thus be some profit in substituting the manufacture of butter for that of " ricotta, " especially during winter, when butter finds a ready sale.

910

VELTEN. **Irish Butters.** (Les Beurres irlandais). — *L'Industrie du Beurre*, Année 6, N. 13, pp. 150-151, Niort, mars 1911.

United Kingdom: Ireland

Irish butter is classed commercially in three sorts, according to its origin: " creamery, " " dairy " and " factory. "

The quality most in request is the " Creamery butter ; " it is absolutely unmixed, made from cream, centrifugated and prepared in premises specially adapted to the manufacture of butter in commercial quantities. The " Dairy " butter is made on the farms, after the milk has been creamed, either by hand or machinery. As to the " Factory " butter, it is a butter which is either blended, or submitted to some other process.

The inquiry made in Great Britain shows that Irish butters of the best quality are superior to the best foreign butters, while the average butter is inferior to that of the butters competing with it. The consignments of Irish butter to the English markets are very irregular, both as to quality and quantity.

Greater uniformity is desireable in packing. Creamery butter is packed in pyramid shaped cases of 56 English lbs (25.368 kg.) or in barrels of 112 lbs. (1 cwt.), (50.736 kg.), or in half barrels, or *kegs*, of 56 lbs.; it is also packed in pyramid shaped cases containing 28 lbs. (12.683 kg.).

The Committee of Inquiry recommends the adoption of the pyramid case as distinctive of Irish butter.

911

CRISPO. **On the Alleged Loss of Soluble and Volatile Acids in Potted Butter.** (Sur la prétendue perte des Acides solubles et volatiles par le vieillissement du Beurre. — *Annales des Falsifications*, pp. 101-103, Paris, Genève, Feb. 1911.

Belgium

Melted butter preserved in cork-stoppered jars has a tendency to gain a little in volatile acids, within the limits of toleration. Within these limits, Mr. Crispo finds that there is no change during three years.

912 **Parmesan Cheese: from Reggio and from Lodi in Italy.** (Grana reggiano, grana lodigiano).—*L'industria lattiera zootecnica*, Anno IX, N. 6, pp. 87-88, Reggio Emilia, Marzo 15, 1911.

Italy
Lombardy
Emilia

Especially during the last five years, the Parmesan Cheese industry in Lombardy and Emilia has been undergoing a transformation the type *grana lodigiano* tending to be replaced by the type *grana reggiano*. According to the Lombard Agricultural Society, there is an advantage in keeping distinct these two types of Parmesan cheese. It has therefore opened a competition to encourage the manufacture of the Lodi "Grana," now diminishing in the quantities produced; the further development of the true Lodi would either limit or stop the manufacture of the Reggiano imitation.

There is less waste in the manufacture of the "Grana Reggiano", and a more regular and higher price is obtained for it than for the Lodi type, which explains the present tendency.

913 RICCIARDO SANFELICE. **Extraction of Lactose from Milk-Serum.** (Un cenno sul "paltone" e sull'estrazione del lattosio dal siero). — *L'Industria latticra e zootecnica*, Anno IX, N. 6, pp. 88-89, Reggio Emilia, March 15, 1911.

Italy:
Emilia

M. Sanfelice has analysed the lactose paste, an intermediary product from which raw lactose or milk-sugar is obtained by the concentration of the residual liquid from the manufacture of "ricotta" and by the separation of the casein from whey.

This dense and viscous mixture called "paltone" consists principally of crystals of lactose and has the following composition.

Water	24.58
Fatty matters	1.26
Albuminoids	5.22
Mineral matters	5.86
Lactose	58.00
Acidity, as lactic acid	4.18
Undetermined substances	0.90
	100.00

Whey gives 8 % of its weight of lactose paste, which contains from 50 to 60 % of sugar of milk. From this *paltone* 44 to 45 kgr.

of raw sugar are obtained from 100 kgr. of paste. The concentration of the whey costs 0.80 fr. per hectolitre (100 litres), which is about 10 fr. for a quintal of paste. The extraction of 100 kg. of refined sugar of milk would therefore cost about 25 fr.

914

Exportation of Animal Products from Denmark in 1910. (Exportation des produits animaux du Danemark en 1910). — *Feuille d'Informations du Ministère de l'Agriculture*, N. 9, p. 4, Paris, Feb. 28, 1911.

Denmark

Agricultural products represent usually little more than 4/5 of the total exports from Denmark. The value of these exports in 1910 was estimated at about 550 million francs, or 20 millions more than in 1909.

The butter exports amounted to 88 000 000 kg., about a million kilograms less than the butter exported during the two preceding years

The butter in barrels is exported to the following countries:

Great Britain	82 250 000 kg
Germany	2 600 000 kg
Austria	750 000 kg

The butter in tins goes to extra-European countries.

The exportation of cream to Germany is continually increasing: only 500 000 kg. in 1904, but 16 million kg. in 1910.

The exportation to Germany of milk, on the contrary, has considerably decreased. The great production of milk in Denmark in 1910 led to a great increase in the exportation of cheese, especially of casein, for which there is an active demand on the German market; 250 000 kg. of cheese were exported, and 500 000 kg. of casein.

The exportation of fresh, salted or smoked pork in 1910 was about 96 1/2 million kg. The total exports of Danish bacon went to England.

About 20 million score of eggs were exported in 1910, or an increase of a million score since 1909. Nearly the whole of the exportation of Danish eggs went to England, about half a million being sold in other countries.

Denmark is aiming at widening its markets, especially in Switzerland, Italy and Austria.

The export of live cattle was 140 000 head in 1910, against 98 600 in 1907. Of these, 17 000 head went to Sweden, and nearly all the rest to Germany. Norway and Switzerland bought 400 head, and Russia 700 bulls.

The sale of butchers' meat has nearly doubled during the past four years; 11 million kg. were sold in Germany, 2 $^{2}/_{3}$ millions to England, 1 $^{2}/_{3}$ millions to Norway, and 1 $^{1}/_{4}$ millions to Switzerland.

The greater number of horses exported went to Germany, which bought 22 800 horses and 3400 colts.

915 **Meat Consumption in Germany, from 1900 to 1910.** (Der Marktverkehr mit Vieh auf den 40 bedeutendsten Schlachtviehmärkten Deutschlands in den Jahren 1900-1910). *Mitteilungen der Zentralstelle der Preussisschen Landwirtschafts-Kammern.* Berlin, Jan. 16, 1911.

Germany Reports are given of the number of cattle, calves, sheep and pigs slaughtered during the past ten years in the 40 most important slaughter houses of Germany:

	Oxen, head	Calves, head	Sheep, head	Swine, head
1900	1 249 185	1 354 083	1 240 551	3 863 373
1901	2 312 131	1 420 154	1 208 425	3 026 066
1902	1 275 212	1 348 872	1 206 878	3 335 143
1903	1 237 160	1 208 194	1 095 749	4 088 206
1904	1 255 200	1 309 871	1 124 516	4 593 821
1905	1 281 533	1 319 931	1 195 021	4 153 983
1906	1 331 051	1 307 967	1 183 341	4 184 218
1907	1 340 511	1 389 614	1 167 155	5 482 194
1908	1 406 657	1 448 998	1 179 968	5 348 183
1909	1 520 622	1 493 359	1 258 857	5 012 919
1910	1 471 101	1 383 807	1 220 478	5 286 06[illegible]

The greatest increase in the number of slaughtered animals has thus taken place first with the swine, and then with the oxen. The number of calves has varied very little, while the sheep show a gradual decrease.

The British Meat Supply from America. — *The Times* (Finance, Commerce and Shipping). London, Febr, 13, 1911. 916

United Kingdom. United States. Canada. Argentina Uruguay. Australia.

In 1904, Argentina and Uruguay sent 1 675 271 cwt. (1 cwt. = 50 kg.) of beef to the British market; and this exportation rose to 5 041 138 cwt. in 1910.

During the same period, the imports from the United States; fell from 2 395 836 cwt. to 477 147 cwt. These figures refer to chilled or frozen beef only. Live steck is still imported from the States whereas importation from Argentina is forbidden for the sufficient reason that its herds have not been freed from aphtose fever.

The conditions in which pastoral industry is conducted in the outh American Republics do not permit of the exercise of equal care in all parts of the country. The importation of live stock from the United States, however, has fallen considerably, though not in the same proportion as that of chilled or frozen beef.

The United States are approaching, and that by swift steps, the time when the population will need for its consumption all the beef the country can produce. Argentina, with a population of five to the square mile and vast reserves of land, is in a position to make good the deficiency.

Other sources of supply have notably increased their contributions to the British market. The imports of chilled and frozen beef from Australia and New Zealand have risen from the 251 357 cwt. of 1904 to 1 413 525 cwt. in 1910, while minor sources put together as *other countries* have advanced from 27 567 cwt. to 83 282 cwt. in the same period. The relative growth of the imports from these countries is as great as it is in the case of Argentina.

The total supply from South America is, however, far greater than the total from all other sources. Of 7 015 478 cwt. of chilled or frozen beef imported in 1910, 5 041 138 cwt. came from Argentina and Uruguay. The export of mutton from the River Plate is not of the same importance as the export of beef, and has been nearly stationary for the last six years. The amount for 1904 was 1 422 397 cwt. and it had risen only to 1 510 138 cwt. in 1910. Meanwhile the supply from Australia and New Zealand had grown from 1 789 907 cwt. to 3 629 572 cwt.

The money value of the beef imported from the river Plate affords another way of illustrating its predominance. This meat is cheaper than that of English-killed North American stock, and much cheaper than British-bred beef)

Yet the value of South American refrigerated meat imported in 1910 was £ 8 450 629 (fr. 213 605 632).

The live stock and refrigerated meat imported from the United States and Canada taken together were valued at £ 5 052 277. In the case of live stock, this includes the value of the hides and by-products which are not sent with refrigerated meat.

917 **Wool Production in Russia in 1910.** (La Production de la Laine en Russie eu 1910). — *Feuille d'informations du Ministère de l'Agriculture*, N. 7, p. 4, Paris, Fév. 14, 1911.

Russia

The quality of the wool as well as the yield per head were very variable in the different regions of Russia, but the production in 1910 was not very far from the average. In the region of the Don and in the Crimea the production was smaller than in the year 1909; the Don and North Caucasia together only furnished 10 000 puds (about 160 000 kg.) against 20 000 puds in the previous year (1).

The yield per head was on the average 3 Russian lbs. and a half (1 Russian lb. = 409 gr.). The degree of purity of the raw wool varied greatly and is entirely dependent on local conditions.

Sheep-raising is evidently on the decline. There are many causes for this, the three main ones in order of importance being: the reduction of grazing lands to increase arable land; the inferior quality of Russian breeds; the bad conditions under which Russian sheep are raised.

The scarcity of winter fodder has often contributed to the reduction of the flocks.

918 **Skins from of Somaliland.** (Pelli del Somaliland). - *La Conceria e la Calzoleria meccanica.* Anno XIX, N. 460, pp. 63-64, Torino, Feb. 20, 1911.

Italian Somaliland

The skins of sheep and goats, bought in small quantities by caravans, are sent to the coast by the agents of business-houses in Aden, where they arrive uncured and simply sprinkled with naphthaline. After sorting, those which appear to be best adapted for European tanning are sent to Europe. The skins from Mombasa are dirty grey, dry and hard as stone, cut along the belly; those from Italian Somaliland are blackened by the sun and cut in squares, while the Abyssinian skins are a mahogany brown and those from the Yemen are clay-coloured, with very characteristic wool. The choice skins, which are long, fine, of a fine yellow colour and of an oily appearance, come from Berbera and Gesila.

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(1) 1 *pud* contains 40 Russian pounds, and is equivalent to 36 lbs English. 1 Russian pound is equiv. to 9/10 of an English lb. [*Ed.*]

The value of the product also depends upon the weight, and comes under four categories.

The exportation of these skins, part of which go to Europe and part to India, is the most important trade of Aden. Out of 8 million exported in 1908-1909, 2 millions came from British Somaliland, and the remainder from Yemen, Eritrea, Abyssinia, Italian Somaliland and Mombasa.

J. M. BARTLET **Digestion Experiments with Poultry.** — *Weekly Globe and Canadian Farmer*, n. 9. Toronto, January 4, 1911. **619**

Canada

In these experiments the common poultry foods were used. East of the Rocky Mountains maize is universally given to poultry. On the Pacific coast, wheat largely replaces maize. In other regions oats and buckwheat or India wheat (syn: Tartarian Buckwheat) form an important part of the ration. In the mashes, wheat bran forms often as much as 50 per cent.

The results obtained in the experiments indicate that the digestion coefficient of most foods for poultry is not materially different from that for other farm animals. Unlike ruminants, however, they digest very little crude fibre; hence a coarse food, carrying much of this material, is but of little value to them.

The nutrients of wheat do not seem to be as well utilised as most other concentrated grains, the ether extract showing a particularly low coefficient. Bran also shows low digestibility in total organic matter, in ether extract and in nitrogen free extract.

The mixture of equal parts of maize meal and fine cut early clover was sufficiently bulky to feed with concentrates, and was more digestive and more economical than bran used in mashes.

Maize is a most valuable grain for poultry, for its palatability and high digestibility. It cannot, of course, be used alone, but when combined with food rich in protein and some bulky material, such as cut clover, it makes up a most desireable ration.

Tartarian Buck-wheat or "India wheat" compares favourably with oats as a grain for fowl. It is an excellent grain, but much more expensive than maize.

The mixing of about 7 per cent of bone ash with a ration consisting wholly of vegetable matter gave slightly higher average digestion coefficients than when the vegetable mixture was employed alone.

920 ALLEN. **Mustard and Egg-Production.** — *The Illustrated Poultry Record.* Vol. III, N. 5. London, February, 1911.

Great Britain

To ascertain whether stimulants to digestion would encourage egg production, Mr. Allen experimented with three pens, each of six Buff Orpington pullets, all of which received the same quality and quantity of food. The first pen had no stimulants whatever, the second had half an ounce of capsicum added to their rations, while the third received one teaspoonful of mustard.

The results can be summarized in the following table:

		1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Total
Ordinary food	Eggs	142	227	306	239	914
With capsicum	,,	108	291	275	231	905
With mustard	,,	222	310	284	207	1023

Sevenpence halfpenny (0.73 fr.) per hen, or 3 s. 6 d. (4.38 fr.) for the pen was spent on mustard during the twelve months; 17 s. 8 d. (22.09 fr.) worth more of eggs was the result, or an extra profit of 14 s. 2 d. (17.71 fr.) from the six birds, which equals over 2 s. 4 d. (2.95 fc.) per head.

The pen of birds which had received an addition of capsicum to the ordinary food, did not produce as many eggs as did those which received no stimulant at all. This result seems to confirm the general opinion that the prolonged use of drugs and hot spices affects the constitution of the birds, usually terminating in derangement of the liver. Mustard is, however, somewhat different in its effects, since one of its specific actions is to stimulate the secretion and flow of the salivary glands, thus predisposing the food for digestion.

RAYMOND PEARL and FRANK M. SURFACE. **Heredity of Barred Plumage in Poultry**. *The Illustrated Poultry Record*. Vol. III, N. 5. London, February, 1911. **921**

Great Britain

The writers crossed the Plymouth Rocks (which owe their barred marking to the Dominique) with the Cornish or Indian Game, which are largely glossy black, with bay and dark red, in which there are no signs of barring, present or latent. The crosses made were in both ways possible.

Twelve matings were tested between Barred Rock males and Cornish Indian Game females, from which 223 chickens were hatched, of which 138 — namely 70 males and 68 females — were reared to maturity. Of the reciprocal cross (*i.c*, between the Cornish Game cock and the Plymouth Rock hens) twenty five matings were tested, from which 251 chickens were hatched, of which 191 — namely 95 males and 96 females — were reared to maturity.

The results are very striking indeed All the progeny of the first-named cross without exception were barred, thus following uniformly the plumage of the fathers. But of the reverse mating, all the male offspring were barred, as were the mothers, but the female offspring were solid black over the whole body and showed no evidence of a colour pattern of any kind. This indicated the strongly inherent character of the barred plumage.

The general result indicates that: (a) the barred pattern is inherited as a unit character, independent of the pigment which fills the pattern, and that (b), more intense pigmentation is dominant over less intense, with the final result that (c) the actual somatic (body) barring is less well defined in the barred hybrids than in their barred parents. Further, the ground colour of the barring is different in the hybrids from what it is in their barred parents.

R. PEARL and F. M. SURFACE. **Seasonal Distribution of Egg Production.** — *U. S. Department of Agriculture, Bureau of Animal Industry.* Bulletin 110, Part II, pp, 170 + fgs, 30. Washington, 1911. **922**

United States: Maine.

This paper constitutes Part II of a general study of egg production in the domestic fowl and deals especially with the distribution of egg production in each month of the pullet-laying year. The data on which the study is based are the trap-nest records of Barred Plymouth Rocks collected at the Maine Experiment Station, comprising detailed monthly egg records of more than 2400 birds, collected in a period of nine consecutive years. The chief results were as follows:

1. The mean monthly egg production exhibits the following characteristic changes in the course of the laying year:

a) The lowest mean production of the year is in the month of November;

b) The mean monthly production increases in December and January at a relatively very rapid rate;

c) There is a slacking up in the rate of increase in February, which probably represents the point of the ending of the first, or winter, cycle of egg production;

d) The mean production reaches a maximum in March.

e) While the mean production of April is practically the same as that for March, there is a steady decline after April on to the end of the laying year in October;

f) There is a tendency towards a slightly larger drop in May. This is the period of natural broodiness.

2. The present data indicate that only a trifle more than a quarter of the total eggs produced are laid in the winter third of the year (Nov. 1 to March 1). In the first two-thirds of the laying year approximately three-fourths of the total eggs are produced.

3. The month of maximum productivity varied, in the experiments furnishing the present data, with the method of housing. In a closed warmed house the month of maximum production was April; in a curtain-front house it was March.

4. The greatest relative variability in egg production is at the beginning of the laying year (month of November). The month of lowest variability, both absolute and relative, is April.

5. The laying year may be divided in four natural periods or cycles with reference to egg production. The first of these periods (roughly November 1 to March 1) is the winter period, wherein egg production is essentially an unnatural (i. e., forced or stimulated) process. The second or spring (roughly March 1 to June 1) is the natural laying period of the domestic fowl in its normal reproductive cycle. The third (roughly June 1 to September) and fourth

(roughly September 1 to October 31) periods are not sharply separated from one another. The summer egg production represents in part a natural continuance of the normal breeding season (rearing of a second brood by the wild *Gallus*), and in part a stimulated process; the period is terminated by the moult, which is the characteristic feature of the fourth period.

6. There is no evidence that the continued selection for higher egg production, practised during the eight years covered by the experiment, produced any increase whatever in the mean egg production, of any month in the year. On the contrary, the mean production in all but two of the months, actually decreased during the period of selection.

7. So far as there was any change whatever in variability in monthly egg production during the period when selective breeding was practised, this change was not in the direction of a reduction as a result of the selection, but, on the contrary, there was an actual increase in variability in all but one month of the year.

8. The statistics show no bad effect on egg production in the winter months (November to March) of keeping birds in large and crowded flocks. On the other hand, overcrowding tends distinctly to lower summer (and to a smaller extent spring) egg production. It is chiefly as a result of this effect on summer production that the mean annual production is lower in large flocks.

9. The excess in relative variability of egg production in larger flocks (100 and 150 birds) over smaller (50 and 100 birds) observed in the annual records is found upon analysis to be on the whole fairly evenly distributed over the whole year.

By a process of mathematical reasoning set forth in detail in the text, it is shown that the observed facts regarding the character of the distribution of variation in monthly egg production are adequately accounted for by the hypothesis:

a) That variation or changes in the rate of fecundity in the hen are fundamentally or innately continuous (in the mathematical sense);

b) That visible egg production in each individual bird tends to occur in definite cycles or periods of varying length, which alternate with nonproductive periods;

c) That the rate of fecundity (amount of egg production per unit of time, conceived in the sense of the differential calculus) is in any bird at a minimum at the beginning of a cycle of production, increases to a maximum at what may be termed the height of the cycle, and decreases to a minimum (usually quite rapidly) as the end of the cycle is approached.

923

Regulations for Egg Circles, in Canada. - *Report of the Minister of Agriculture for the Year ending October 31st*, 1910, 62 pages Toronto, Ont., Canada

Canada: Ontario.

This is a report of the Department of Agriculture of the Province of Ontario which gives a brief summary of the leading features of the work carried on by all the Branches. A brief statement of the history of the Department and its Branches is given. The report is treated under the following heads: Ontario Agricultural College, Ontario Veterinary College, Bureau of Industries, Agricultural Societies, Live Stock, Farmers' Institutes, Fruit, District Representatives, Colonization and Immigration, Factory Inspection, and Present Status of Agriculture. A specially interesting section of the report is that dealing with District Representatives among whom there are fourteen graduates of the Ontario Agricultural College located in towns of as many counties, with the object of imparting agricultural instruction in the High Schools and also bringing agricultural information to the doors of the farmers. Among other duties these representatives have organized Farmers' Clubs, Horticultural Societies, Stock judging Competitions and Schools, Co-operative Egg Circles, etc. The following rules govern the Egg Circles:

1. Each member should bear in mind that the aim of the Association is not only to get better prices, but to raise the standard of poultry produce, and make the trade-mark an absolute assurance of quality.

2. All produce of a member must be shipped through the central depot, except what is required for home use, and each package must bear the trade-mark, grade and number of the Branch.

3. Each member must mark his produce with the trade-mark supplied, and the Superintendent's ruling in regard to quality shall be considered final.

4. Male birds are allowed with the flock during breeding season only, and in no case later than June 1st, when they must be killed or otherwise disposed of.

5. Only artificial eggs may be used for nest eggs. Eggs must be gathered at least twice a day and kept in a cool room free from draught, dampness or any foul odours, and of a temperature not exceeding 60° Fahr. (= 15° C.).

6. Eggs must be delivered at the central station at least twice a week in warm weather, and at least once a week in cold weather.

7. No eggs older than four days in warm weather, and seven days in cold weather, may be delivered.

8. Only clean eggs may be delivered, and they must be kept protected against the sun, rain or frost, by the members as well as by the collector.

9. Members may deliver only the produce of their own flocks and must allow their premises to be inspected by the Superintendent at any time.

10. Poultry houses or yards considered unsanitary, or containing diseased flocks, will be excluded from contributing through the circle.

The report concludes with an article on Electricity on the Farms.

A New Point in Artificial Incubation. — *The Illustrated Poultry Record.* Vol, III, No. 4, p. 158. London, January 1911. **924**

Germany Westphalia

Mr. Sweers, at Hüls near Crefeld, Germany, experimenting on artificial incubation, has been puzzled by the greater evaporation of machine-hatched eggs as compared with those under hens. Further, his experience has been that generally a higher percentage of chickens is obtained in an incubator when used for the first time, and that succeeding hatches seldom give equal results. After prolonged investigations, he has come to the conclusion that this is due to changes in the wood of which the machine is made, which, by loss of moisture, becomes absorbent. Therefore, during the embryonic stage and after hatching, the wood attracts the humidity, thus causing enfeeblement, as indicated by death before and after hatching. To counteract this influence he has covered the inside wood entirely with oil cloth, sides, tray, bottom, etc. and states that doing so has removed the trouble.

925 **Exporters of Poultry and Eggs.** (Les expéditeurs d'œufs et volatiles). — *L'Industrie laitière*, N. 11, pp. 180-181, Paris, Mars 12, 1911.

France

The Federation of French exporters of eggs, poultry and game held its third Annual Congress on February 19th, 1911. Amongst other things, the Congress decided that the sale of blemished eggs, (*œufs tachés*) sold as such, having always been legal, and even commercially defined, could not be prohibited without doing injury to trade, and still less could it be considered as a fraud.

The Congress called the attention of the authorities to the great decrease over a large part of France of non-migratory game, and to the importance of preserving it by every possible means.

The Congress also expressed the desire that instruction in poultry-rearing should be given in all schools of agriculture, and in dairy schools, and that eggs should be admitted to compete for prizes at the General Agricultural Exhibition at Paris.

926 **Two Little-Known Poultry Breeds.** — *The Illustrated Poultry Record.* Vol. III, No, 4, pp. 176-177. London, January 1911.

Great Britain

Tailless Fowls. In some fowls there is a distinct loss in that part of the posterior called the "parson's nose", which supports the tail feathers, as a result of which the saddle hackle falls over the stern, giving a shortened appearance. The tailless or rumpless fowls are good layers, and, in some cases, carry a good quantity of flesh. Specimens are found both among Bantams and medium sized breeds, and some remarkably good birds have game plumage.

Frizzled Fowls. The origin of the frizzled breed of poultry appears to be Asiatic, for it is found in Southern Asia and in the Eastern Archipelago. It is well known in Ceylon and the Mauritius. The peculiar reversion and curling of the feathers that are characteristic of frizzles is not only present in individuals, but is transmissible and in fact, a breed character.

The feathers are, as a rule, thin and open in texture, but the skin has a downy covering of very fine, soft feathers.

The prettiest birds are either all white or all black, but colouration is very varied. They are short in the leg, and vary considerably in comb, some being single, some rose. They are, when naturally bred, hardy, make excellent sitters and mothers, and fair layers, but the eggs are small.

Ostrich - Breeding near Hamburg. (Un allevamento di struzzi nelle vicinanze di Amburgo). *L'Agricoltura Coloniale,* N. 2, p. 77; Firenze, Feb. 1911. **927**

Germany: Hamburg

A park of 2.5 hectares in the environs of Hamburg has been set apart for the raising of ostriches; it includes a shelter for the night, an infirmary, a shed for the chicks and incubators, as well as one for the breedingbirds.

The idea is due to Hagenbeck, and after some failure, during the first year, it has been completely successful. The park contained, last year, 132 ostriches from Somaliland, from German East Africa, from Senegambia, the Cape and the Sudan. The incubators are heated by petroleum, and during the first weeks the chicks are fed on chopped lucerne, whilst from the sixth week they are given chopped hay mixed with maize, bran or barley. Their increase in weight is remarkable; they have gained as much as 3.3 kg. in the first 8 days.

Mr. Hagenbeck proposes to organise the retail sale of the feathers produced as a result of his experiment, which has proved that it is possible to acclimatise the ostrich in cold countries.

A. T. JOHNSON, **Ostrich Farming in America.** — *The Illustrated Poultry Record.* Vol. III, N. 6, pp. 270-272 London, March 1911. **928**

United States: California

Many ostrich farms have arisen in the warmer parts of North-America. The oldest and first-established of these was started 20 years ago at Pasadena, South California. There are some hundreds of ostriches kept here, most of them being youngsters and stock birds, but on a branch establishment on the Jacinto Hills there is a reserve flock of over a thousand.

The climate of Southern California has proved to be perfect not only for the general health of the birds, but the soil is good for feather production. The young birds shoot up at the rate of a foot (30 cm.) a month; and in 8 or 9 months after leaving the eggs the birds will be as many feet (2.40 to 2.70 metres) in height, often weighing nearly 200 lb. (90 kg). Alfalfa, whether eaten in the green state or quite dry as chopped hay, has a great influence on the development of young ostriches in captivity. Alfalfa feeding has also increased the fertility of the females. The birds are 4 years of age before commencing to lay, and a female may produce from 30 to 60 eggs (each weighing from 2 ½ to 3 lbs., i. e., from 1100 to 1400 grams) in the course of a season.

929 COCHELET (French Consul). **Influence of Feeding, Season and "Quilling,, on the Crop of Feathers from an Ostrich.** (Influence de l'Alimentation, de la Saison et du « Quilling » sur la Récolte en Plumes d'une Autruche). --- *Bulletin Economique*, N. 1, Madagascar, Tananarive, 1910.

Madagascar

The longevity of the ostrich is well known. When well cared for, an ostrich of 35 years of age will furnish nearly as good a crop of feathers as a younger bird. The length of time during which one of these birds will continue to give a good supply depends on how it is treated. Under natural conditions, the ostrich produces a new crop of feathers every year, but the breeder gets a larger yield from it when domesticated, on account of the system of *quilling* (1) every eight or nine months.

The feeding and the individuality of the birds also have a considerable influence on the yield of feathers. It is for the breeder to decide whether he will get as much out of his birds in as short a time as possible, or whether he will allow them to do their best for a longer period, without there being the slightest deterioration in the feathers.

930 **Sericulture in the Trentino** (La bachicoltura nel Trentino). *Bollettino di Sericoltura*, N. 8, p. 77, Milano, Feb. 25, 1911.

Austria: The Trentino

The course at the Institute of Sericulture, at Trento, has been inaugurated in the presence of 64 students.

The *Società fra i produttori dei bozzoli* is also occupied in actively promoting sericulture, devoting itself especially to the encouragement of the production of the finest kinds of silk and those which are most in demand. Prizes are awarded to the best breeders, and those competing for the prizes, in addition to having obtained the best crops, must have introduced rational systems of ventilation, heating and disinfection of the premises in which the worms are bred. The silkworm nurseries are to be under the control of a technical staff.

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(1) « Quilling » is an operation which consists in removing the ripe quill, or rather the tip from which the feathers have been clipped, leaving the remainder in the socket until it ripens; thus an artificial uniform moulting is provoked. [*Ed.*].

931

Premiums for Silkworm Breeding in Brazil. — *The Board of Trade Journal*, N. 742, p. 378. London. Feb. 16, 1911.

Brazil

The President of the Republic is authorised to expend 10 000 milreis currency (about 17 000 fr.) by way of premiums to silk cocoon producers, to be awarded at the rate of one milreis (1.70 frs.) per kilogram of cocoons produced in Brazil, and 5000 milreis currency (about 8500 frs.) in premiums to silk producers who can prove that they have at least 2000 mulberry trees devoted to this industry (1).

932

Edmond Moreau **Biological Analysis of Honey.** (Analyse biologique des Miels) — *Annales des Falsifications*, V Année, N. 28, pp. 145-148, Paris-Genève, Mars, 1911.

France

A biological analysis is a useful complement to the chemical analysis of honey, giving the chemist the opportunity of noting the value and nature of the product submitted to his examination. In a preceding note, Mr. Moreau showed how the amount of the catalase may be determined, and evidence obtained of the presence of amylase and invertine in honey. The proportion of amylase, and especially of invertine, may be found by estimating the products of hydrolysis; this is shown by the writer, who points out the technique of the determination.

933

Edmond Moreau. **Identification and Estimation of the Proteic Substances in Honey.** (Identification et dosage des substances protéiques dans les miels). — *Annales des Falsifications*, N. 27, pp. 36-41, Paris-Genève, Jan. 1911.

France

This is a description of some qualitative and quantitative examinations, and is accompanied by a table giving the total content in albuminoids and of heat-coagulable albumin. The experiments lead to the conclusion that the proteids of honey are variable both in their composition and also in their quantities and point to the assumption of the presence of a peptic ferment in honey.

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(1) The value of the currency milreis fluctuates; in 1908 the average rate of exchange was 15 *d*. *The Statesman's Year-Book*, 1910, p. 666. [*Ed.*].

934 **Mexican Honey.** — *California Fruit Grower*, San Francisco, February 11, 1911, p. 7.

Mexico

The exports of honey from Tampico to the United States during 1910 amounted to 43 575 gallons (164 931 litres) valued at 21 380 gold dollars (110 748.40 fr.), an increase of about 6.6 per cent. over 1909.

The greater part of the honey is the wild product, and is brought in from the Huasteca section and Tuxpam. Among the flowers that are abundant are the «Century plant» (1) and the «Lion's tooth» which are much sought after by the bees. A species of mesquite known as *algorroba* furnishes an abundance of blossoms and a sweet sap, and the bees frequently hive in its hollow trunk.

The seasons for gathering honey are from May to July and from September to November.

935 G. BESANA. **Fresh Water Fish in Italy and in Austria.** (La pesca d'acqua dolce in Italia. Confronto con l'Austria). - *Bollettino della Società lombarda per la pesca e l'acquicoltura*, Anno IV, N. 3, pp. 33-36. Milano, Marzo 1, 1911.

Italy. Austria

It may be said that rearing carp is no longer practised in Italy, because only one firm has started the raising of «mirror carp» (2) in the Lake of Comabbio (province of Como). This industry was introduced some years back in the rice fields near Bologna and Mantua, but was afterwards abandoned. In the rice fields near Lodi, where carp-culture is carried on under the direction of the Hydrobiological Station (Stazione d'Idrobiologia) of the Municipality of Milan, excellent results have been obtained.

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(1) *Agave americana*, Amaryllidaceae. (BAILEY, *Cyclopedia of American Horticulture*, New York, 1909). [*Ed.*].

(2) *Ciprinus Carpio specularis.* [*Ed.*].

In order to encourage the raising of carp in various districts, the Government has offered a subsidy to the above mentioned Station.

There are about 200 000 hectares of land in Italy under rice cultivation, which, in addition to the rice, could produce carp to the value of 10 million francs (£ 400 000) at 1 fr. per kg.

Italy has about 160 000 hectares of lakes, 64 000 hectares of rivers, 20 000 hectares of submerged valleys, 3164 of navigable canals, 193 000 of secondary water courses, 1 300 000 hectares of ponds and marsh lands, or a total of 1 570 164 hectares covered with water. In the whole of this area, the fish harvest only amounts to between 3 and 7 million francs (£ 120 000, £ 250 000) yearly, which on the best hypothesis, means an average yield of 4.50, to 6 kg. of fish per hectare.

Taking account only of the lakes, water courses, canals and valleys, there are 500 000 hectares which only yield, at the highest computation, 14 fr. per hectare.

Professor Giglioli points out, in his work *Malessere agrario ed alimentare in Italia*, that the eighteenth part of the Italian territory is covered with fresh water, and with a small proportion of brackish water; the whole of this area could be utilised for fish culture on a large scale.

Austria possesses 36 000 hectares of lakes, and 55 852 kilometres of streams, or a total area of 208 000 hectares covered with water, or not a seventh part of the Italian fresh water area. The annual production of fish in Austria is about 200 kg. per hectare (at 2 fr. per kg.), or about 30 times the total Italian production.

L. ORSENIGO. ***Salmo salvelinus* in Italian Waters.** (Il Salmerino nelle acque italiane). — *Bollettino della Società lombarda per la pesca e l'acquicoltura*, Anno IV, N. 1, pp, 3-4, Milano, Genn. 1—1911. **936**

Italy

The waters of numerous parts of Central and Northern Europe are stocked with *Salmo salvelinus*, but until recent years it was not found in Italy except in the small lakes of the Trentino and of the provinces of Brescia and Bergamo. where these fish occur in large quantities and are of a very fine quality.

Repeated attempts have been made to acclimatise the fish in other Italian waters, as in the lakes Maggiore, Mergozzo, Montorfano, Idro, Bracciano, Nemi and Mezzano, but without any results, which was undoubtedly because the waters where the experiment was made had too high a temperature. Other unsuccessful efforts have been made to introduce salmerino into the Lake of Lugano. Some attempts were made, however, from 1896 to 1906, with eggs from the Lake of Zug, which were hatched in an incubator, and in spite of the heavy losses at first, the *salvelinus* became acclimatised in the lake. Fishing began in 1910, and the shoals have ever since been growing more plentiful.

The hope is thus aroused that it will not prove impossible gradually to acclimatise this valuable salmonid in Italian waters.

In 1910, 30 000 fry from the Lake of Lugano were placed in Lake Maggiore, and it is hoped that the experiment will prove successful.

937 E. CASSEZ. **Muddy Taste of Fresh Water Fish.** (Le Goût de vase chez les poissons d'eau douce). *Revue agricole et viticole de la Haute Marne*, XXXI Année, N. 4, Chaumont, Févr.. 16, 1911.

France The algae *Oscillaria* are very numerous in waters where the fish have " a muddy taste "; if rubbed between the fingers, they emit a very characteristic odour. Mr. Edmond Perrier has shown that if there are no *Oscillaria* in the water, the fish have no unpleasant taste, while if fish from very pure waters are placed in a basin where these algae are flourishing, their flesh soon becomes impregnated with the odour of mud.

This effect may be lessened by keeping the fish for several days in pure running water, the greater part of the odorous substance being undoubtedly eliminated by the excretory apparatus.

938 **Fish Culture as a Means of controlling Malaria in Rice Fields.** (Bekämpfung der Malaria durch Karpfen). — *Oesterreichische Fischerei-Zeitung*, S. 86, Wien, März. 1. 1911.

Italy There are about 200 000 hectares of rice fields in the valley of the Po, which are covered in summer with water to a depth of from 20 to 30 cm. The rice zone is very frequently infested with malaria.

The breeding of carp has been tried in the rice fields, and for some years past excellent results have been obtained. The young fish, barely 10 mm. in length, are put into the fields from the end of June. By the month of September, they are already large, and are found in sufficient quantity to yield a quintal of fish per hectare.

Four or five francs will buy enough fry to stock a hectare, and there is no further expenditure. Rice-field carps are well nourished and have a fine flavour. The rice also seems to derive benefit from the presence of the carp, for the fields where these fish are raised have given an additional 5 to 6 quintals of rice per hectare.

The fish clear the plants of vegetable and animal enemies and devour the larvae of the Anopheles thus contributing to render the malarial zone healthy.

Agricultural Industries

Delimitation of the " Bordeaux " Wine District in France. (Délimitation de la Région ayant pour ses Vins un Droit Exclusif à l'appellation " Bordeaux ". — (*Journal Officiel* du 19 Fév., 1911). *Bull. des Rens. Agric. du Ministère de l'Agriculture*, pp. 154-156, Paris, Fév. 1911. **939**

France: Gironde

By a decree of February 18th, 1911, the district name of " Bordeaux " is exclusively reserved to wines made from grapes gathered in the following territories: the Department of the Gironde, with exception of the following Communes:

In the arrondissement of Lesparre, canton of Saint-Laurent: the commune of Carcans Hourtin.

In the arrondissement of Bordeaux, all the communes of the cantons of Arcachon, Audenge de Belin, la Teste. In the cantons of Castelnau: Brach, Saumos, Lacanau, le Temple, le Porge.

In the arrondissement of Bazas, canton of Grignols: the commune of Lerm-et-Musset; canton of Villandraut: Bourideys Lucunau, Cazalis; canton of Saint-Symphorien: Hostens, Saint-Léger, Saint-Symphorien; canton of Captieux: all the Communes.

940 **The Dry Extract of Red Gironde Wines.** (L'Extrait sec des Vins Rouges Girondins). — *Annales des Falsifications*, IV année, N. 28, pp. 97-99, Paris-Genève, Fév. 1911.

France: Gironde

The average amount of the dry extract resulting from nearly 1 600 analyses of the red wines of the Gironde from 1898 to 1909 inclusive, has varied between a minimum of 20.2 gr. and a maximum of 22.9 per litre.

The dry extract in question is the reduced extract, as defined by the French regulations; it is the extract obtained by evaporation in a water-bath at 100° C., diminished, when necessary, by the weight of sugar exceeding a gram per litre. There is no need to make the reduction prescribed for wines to which gypsum has been added (*plâtré*), because this substance is never used for the wines of the Gironde and they contain more than 1 gr. of sulphate of potash per litre.

These declarations were made in a report of experts, signed by Mr. Guyon, honorary doyen and professor of the *Faculté des Sciences* of the University of Bordeaux, and by Drs. Blarez and P. Carles, legal chemical experts of the Judicial Courts.

941 FERREIRA DA SILVA. **Fermentation and Composition of Madeira Wines.** (La Vinification des Vins de Madère et leur Composition). — *Annales des Falsifications*, IV année, N. 28, pp. 57-65, Paris-Genève, Fév. 1911.

Portugal: Madeira

A Portuguese Law of March 11th 1909, limits the districts within which wine may be called "Madeira". Some analytical tables published by Mr. Da Silva show that the average alcoholic strength of Madeira wines is 20 per cent, with a maximum of 23.30 and a minimum of 16.60. The total acidity of these wines is generally high, averaging 5 gr. per litre.

Contrary to current opinion, the Madeira wines are not dry, but contain more or less sugar.

The most renowned vine varieties at Madeira for the manufacture of these wines are the *Boal*, the *Sercial*, the *Verdecho*, the *Malvazia* and the *Finta*. The vineyards about half way up the mountains in the island produce the best wines.. The musts give from 19 to 28 % of sugar.

VOISENET. **The Formation of Acrolein in the Bitter Disease of Wines.** (Formation d'acroléine dans la maladie de l'amertume des vins). *Revue de Viticulture,* N. 897, pp. 234-236, Paris, Fév. 1911. **942**

France

Mr. Voisenet has found the existence of acrolein in bitter wines easily ascertainable by means of various reactions. After concentrating the more volatile constitents of the wine to a small volume of distillate he obtained with the nitrous hydrochloric albumin mixture, a reaction of a characteristic greenish-blue colour. The reactions of colouration with phenol, the action on permanganate of potassium, and physiological experiments all gave positive results. The writer made a comparative and colorimetrical measurement of the quantities of this aldehyde in the various wines; he found, in a wine which was as bitter as quinine, 0.15 gr. of acrolein per litre, in a very bitter wine, 0.10 gr. and in a distinctly bitter wine 0.04 gr.

This formation of acrolein in bitter wines confirms the marked preference of the bitter ferments for glycerine.

It remains to be seen in what manner this transformation of the glycerine into acrolein is effected.

As acrolein is very poisonous, it will be understood that it would not be advisable to produce alcohol from bitter wines.

EUG. ROUSSEAUX and SIROT. **Influence of Air on Wine, in Connection with Analyses for Adulteration.** (Influence de l'exposition du vin à l'air sur sa composition dans la recherche de ses falsifications). *Annales des Falsifications,* IV, année N. 28, Paris-Genève, Feb. 1911. **943**

France

The writers, fearing that the exposure of a sample of wine in a dish for twenty-four hours might have modified its composition to the point of giving it the characteristics of a wine adulterated with water, investigated the matter thoroughly. The results showed that there really is a disappearance of alcohol, but there was also an apparent increase of other constitents of the wine, which is in contradiction with all practice in the watering of wine.

The exposure to air of wine in a shallow vessel, or the mixture of such a flat wine with the same wine in a natural state, could not give rise to a suspicion of watering.

941 **Oat Malt.** — *Pure Products*, Vol. VII, N. 3, p. 149. New York, March 1911.

United States

The high price of barley malt has drawn attention to oats as a substitute, oats being much cheaper than barley. At the laboratory of the Scientific Station for Pure Products, New York, the following analysis of a sample of oat malt is reported:

Moisture	4.5 %	Time of conversion . . .	8 minutes
Extract, fine ground . .	53.02 »	Filtration of wort . . .	very slow
Extract, course ground .	52.2 »	Appearance of wort . .	clear
Difference between the		Colour (Stammer) . . .	0.94 (pale)
grindings	0.82 »	Nitrogen	1.913 %
Extract in dry substance	55.5 »	Albuminoids	11.05 %
Flavour of mash	good »	Diastatic power	20.2 %

According to the above analysis, oat malt is characterized by a very low yield in comparison with barley malt, very slow filtration of the wort and very high percentage of albuminoids. The wort has the characteristic oat taste, being pronounced straw-like.

In spite of the high price of barley malt, it is doubtful whether oat malt should be used in the manufacture of high-grade bottled beers or high-grade draught beers.

945 **Alcohol from the Carob Bean.** — *Journal of the Royal Society of Arts*. N. 3040, p. 346. London, Febr. 24, 1911.

Portugal. Spain

The discovery that the fruit of the carob tree can be made to yield alcohol has greatly raised its value. This is a leguminous evergreen found in Spain, Italy, and the Levant, and its fruit, commonly called the carob bean, is about one inch wide and from six to eight inches long, and has hitherto been used dried as food for animals. Experiments have lately been made in Spain to obtain alcohol from this bean (1).

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(1) In 1880, Dr. FERDINAND ROSSI, at Portici near Naples, in Italy, experimented both in the laboratory and on an industrial scale in extracting alcohol from carob beans. He found that from 100 kgr. of carobs 24.70 kgs. of pure alcohol may be obtained.

See: FERD. ROSSI, *Estrazione dell'Alcool dalle Carrubbe*. Annuario della R. Scuola Superiore d'Agricoltura in Portici, vol. II, Napoli, 1880, p. 295. [*Ed.*].

After triturating, the fruit was immediately placed in hot water to steep, and the sugar or glucose extracted by means of a current of water. The liquid resulting from this process was then allowed to ferment, the glucose thus being transformed into alcohol, which was later distilled. It was found that 2.3 quarts of pure alcohol could be obtained from twenty-two pounds of the beans. A factory has been established at Faro, in Portugal, furnished with a triturator of 4 000 pounds' capacity per hour. Here the practice is to steep the beans in four or five times their weight of water. The quantity of water depends upon the amount of glucose contained in the beans, which must be determined chemically. The distilling is carried on with the most modern apparatus, because the alcohol from the carob bean, unless very pure emits a peculiar odour and has a disagreeable taste. Owing to the great quantity of carob trees (*algarrobo*) in Spain, this new experiment will probably establish another important industry there, as well as in other Mediterranean countries. Large quantities of the carob or locust bean are grown in the neighbourhood of Barcellona; and in the provinces of Valencia and Castellòn, in the south, the production is even greater (1).

A. PEDROSO. **Henequen alcohol** (2). (L'alcool de Henequen). — *Journ. d'Agric. tropicale*, N. 116, p. 64, Paris, févr. 1911. **946**

Mexico: Yucatan

Some experiments made in Yucatan have given 360 litres of alcohol from 2160 litres of Henequen juice, by means of a ferment prepared by Mr. Castro.

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(1) Carob tree culture is also especially extensive in Cyprus, carob-beans being one of the chief exports of the island. This production in also of considerable importance for Sicily. [*Ed.*].

(2) Henequen is a variety of Agave, as well as Zapupe and Sisal; there is a good deal of confusion in the nomenclature of the fibres which are extracted from the different varieties of Mexican Agave, known as a rule under the generic name of Maguey. Henequen, which is the « Sisal grass » of the American Customs, is derived from *Agave rigida elongata* while sisal properly so called is produced by the *Agave rigida* var *sisalana*. Zapupe fibre is furnished by another less known variety.

(See: A. MARQUES, *Culture et preparation du Sisal*. Ed. Challamel. Paris. 1909, pp 7-8.) [*Ed.*].

The *Courrier du Mexique*, on the other hand, states that some capitalists propose to manufacture alcohol from the juice of Zapupe. If alcohol could be made from the juice, and the fibres of Henequen extracted at the same time, the experiment would be of great interest for the utilisation of by-products.

947 TORTELLI and V. FORTINI. **Identification of Colza Oil.** (Identification de l'Huile de colza). — *Annales des Falsifications.* Année IV, N. 29, pp. 139-145, Paris-Genève, Mars, 1911.

taly

There is no certain special reaction for the examination of colza oil and, generally speaking, for detecting in oil-mixtures the oils extracted from the seeds of Cruciferae. Messrs. Tortelli and Fortini base their method on the properties of erucic acid, which is the principal and characteristic constituent of colza oil, in order to give a certain means of identification.

Erucic acid is very similar to oleic acid, but differs in the weaker solubility of its salts of lead in ethylic ether, and also by the fact that its sodium salt is less soluble in alcohol. The new method consists in the separation of the solid fatty acids from the liquid fatty acids, and in the following three determinations:

1. The iodine index of the fatty acids which form salts of lead absolutely or very nearly insoluble in ethylic ether;

2. The melting point of the acids extracted from the insoluble salts of lead;

3. The critical temperature of solution in alcohol of sodium salts of the mixture of acids obtained by decomposing the lead-salts soluble in ether.

These three determinations allow of the recognition of the presence of colza oil in mixtures, even when the quantity is less than 10 %.

948 **Potato-desiccation in Germany, in 1910.** -- (Betriebsergebnisse von landwirtschaftlichen Trocknungsanlagen). - *Maschinen Zeitung.* 9 J., N. 2, pp. 20-21, Berlin, Jan. 15, 1911.

Germany

In addition to establishments belonging to Companies for the drying of potatoes, which have been founded with this sole object, there are also drying rooms attached as accessories to several establishments such as: starch or alcohol factories, dairy companies, etc.

There are very great differences in the matter of output and duration of work in these establishments. The quantity of potatoes dried in 1910 by each of them varied from 82 647 to 3 131 metric quintals. In 1910, 454 416 metric quintals of fresh potatoes were dried, producing 120 169 quintals of dried potatoes, the greater part of which were in the form of flakes.

It may therefore be admitted on an average that 3.78 kg. of fresh potatoes are required to produce 1 kg. of dried potatoes.

The yield varies greatly, however, according to the percentage of starch in the potatoes. Thus, in 1910, the maximum yield was represented by the ratio 3.17 : 1 between the weight of the potatoes and the weight of the flakes, and the minimum yield by 4.7 : 1.

The cost of drying 50 kg. of potatoes was on the average 62 pfennig (0.77 fr.) in the works dealing only in this commodity; while it was on an average 54 pf. (0.67 Fr.), and varied from 36 to 87 pf. (0.45 to 1.08 Fr.) in the establishments where the drying of potatoes was of secondary importance.

In order that this industry may be profitable as a main business, the factory ought not to work less than from 150 to 200 days a year.

A New Use for Cotton-Seed. — *The Indian Agriculturist*, p. 29, Jan. 2, 1911, Calcutta. **949**

United States: Texas

Cotton-seed oil cake has long been recognised as a valuable food for cattle, but it has only recently been suggested that the seed of the cotton plant can be suitably prepared for human consumption. Dr. Traps, State Chemist of Texas, has investigated a number of samples of bread, cake and biscuits made from a specially prepared cotton seed flour. This is made from cotton seed meal and is then submitted to a special treatment in order to remove the hulls. He describes the cotton seed flour as being of a bright yellow colour with a pleasant odour and a sweetish taste, and in chemical composition having some resemblance to meat. It is found to contain twice as much protein, or muscle producing material, as meat, four times as much as eggs, and four times as much as wheat flour. This, in view of the prevailing high prices of meat, is regarded as a very important point.

950 **The Production of "Tuna" Cheese in Mexico.** *Journal of the Royal Society of Arts.* N. 3040, p. 397. London, Feb. 24, 1911.

Mexico The *Tuna* cheese industry has been of importance in Mexico from time immemorial, and San Luis Potosi has long been the great *tuna* market. The *tuna* plant (1) grows spontaneously in San Luis Potosi, Guanajuato, and Zacatecas, on land too dry at present to permit of much other vegetation. In some parts of San Luis Potosi it grows in such profusion as to render fair returns to landowners, in spite of the exceedingly low price realised for the fruit. The cheese is made by simply boiling and straining the *tuna* pulp until the proper consistency is reached. It is of a chocolate colour, pleasant to the taste, wholesome, and slightly laxative. Sometimes nuts or flavours are added, and it is said to be better when taken with milk. The leaves of the *tuna* plant are used for fodder or dried and used for fuel. The term « cheese » is descriptive only of the consistency of the product; it is, rather, a confection, and is exported from Mexico to the United States, in small packages as a confection.

951 F. BONDIL. **Detection of Olive Pomace in Pepper.** (Sur la Recherche des grignons d'olive dans les Poivres). -- *Annales des Falsifications.* N. 27, p. 36, Paris-Genève, Jan. 1911.

France The reaction used for the detection of olive pomace in ground pepper, by means of a freshly prepared aqueous solution of paraphenylene diamine and some drops of acetic acid, is rendered much more apparent and much more characteristic when the pepper has previously been freed from its fatty matters, by means of either alcohol or ether. The sclerotic cells of the olive-stones are instantly and without being heated coloured a more vivid red.

The same process used in the investigation for discovering sawdust in flour, bran, seconds, bread, etc., gives much clearer results, even for the smallest quantities of sawdust.

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(1) *Opuntia Tuna*, Mill., fam. Cacteae; of the same genus as the prickly pear. [*Ed.*].

Wood Pulp as a Textile Material. -- *Journal of the Royal Society of Arts.* p. 115. London, March, 3, 1911. 952

Germany: United States. Great Britain.

In Germany and the United States « paper-yarn » has long since passed the experimental stage. At first regarded as a curiosity, it was found that yarn could be manufactured from wood fibre more cheaply than from shoddy or cotton waste. The cellulose is cut into flat strips of varying width and thickness, and spun on specially-constructed machines, either alone or with the addition of a fine cotton thread. The cloth is strong, flexible and serviceable, and does not ignite easily. A mill in the Midlands is spinning some 2 000 tons of pulp-yarn yearly, and one mill in Saxony was recently turning out twenty tons a day.

Broom Industry in the United States. - *The Board of Trade Journal.* N. 763, p. 22. Jan. 5, 1911, London. 953

United States Illinois Kansas etc

The *brush* used for making brooms comes largely from Illinois, Kansas, Oklahoma and Tennessee. The growing of the broom corn or *brush* as it is technically called, is very remunerative. Owing to the fact that brush growing is restricted to such a small area, its price is very high, growers receiving from 100 dollars to 350 dollars a ton. In the State of Illinois, the Counties of Coles, Edgar, and Douglas form the larger portion of the producing belt. The States of Missouri, Oklahoma, Tennessee and Arkansas produce an inferior quality of brush. The district surrounding Arcola (Illinois) is regarded as supplying the choicest brush in the world. In Illinois, farms devoted to the cultivation of broom corn range in size from 10 to 100 acres, the total acreage being from 30 000 to 50 000.

The cost of growing broom corn is far in excess of that of growing ordinary maize. Brush is planted shortly after Indian corn, but is gathered during the latter part of September and the early part of October.

The largest broom factory is situated at Evansville (Indiana) where between six and seven thousand brooms are turned out every working day of the year.

954 **Manufacture of Rattan and Sea-Grass Furniture in China.** - *Journal of the Royal Society of Arts.* London, March, 3, 1911. p. 415.

China The Chinese furniture — exported throughout the world is made from Rattan (1), bamboo and other woods wrapped with a large twine or fine rope manufactured from twisted sea-grass. There is no limit in China to the amount of raw material for this sea-grass furniture. The grass grows wild in enormous quantities in the marsh lands along the sea between Hong-Kong and Canton and in all that part of China. The grass is cut by the natives, sun-cured, and sold dry. While the grass, generally, has an uniform light-green colour, and presents a good appearance when made up in its natural shade, there are variations in some grades and under some conditions, so that usually the grass is stained when being made up into furniture.

955 **Preservation of Maize in Venezuela.** — *La Hacienda.* Vol. VI, N. 4, p. 117, Buffalo, Enero de 1911.

Venezuela Mr. Salvador Rustice describes the following process for the preservation of Maize, which is in use in Venezuela.

If large quantities of this cereal are to be preserved, they are placed, after being shelled, in cylindrical tanks of galvanised iron of the capacity of 3 600, 1 600 or 460 pounds (Spanish pound of 461 gr.). In the top of these receptacles there is a circular opening, through which the maize is passed ; it is closed by a lid, also in sheet iron, which is fastened down with a kind of putty. These tanks are placed on wooden supports which preserve them from the dampness of the ground. If care be taken to put the maize in the receptacles only when it is perfectly dry, it keeps extremely well in this way, and may be preserved for an indefinite period. Once the reservoir has been opened however, the maize must be consumed without delay, otherwise it will spoil.

Maize preserved in this fashion does not lose its germinative power.

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(1) *Calamus Tenuis* and *C. Rotang* furnish the Rattan canes. [*Ed.*].

Cold Storage in Floriculture. — *Fruit, Flower and Vegetable Trades' Journal.* March 4, 1911. London. **956**

Great Britain

The system of retarding or prolonging by artificial means the season of rest of hardy plants, bulbs and roots, some years ago was looked upon merely as interesting experiment. To-day it has become a regular business and an actual necessity to the up-to-date market grower, flower salesman and florist. The retarding of plants is carried out by placing them in refrigerators when quite dormant and keeping them permanently at a temperature below freezing point until they are wanted for use. The advantages of the system over forcing are that plants that are amenable to retardation may be had in flower at any period of the year, in less time, in much finer condition, and at considerably less expense as regards firing than by the system of forcing. Purchasers of retarded plants or roots, however, should buy only first quality bulbs and roots, although they will cost rather more than inferior ones, as a few shillings may make all the difference between success and failure.

Among the plants that are successfully retarded are *Azalea mollis, Lilium longiflorum, Lilium lancifolium* and its varieties, Lily of the Valley, *Spiraca Compacta, S. Japonica,* etc.

J. A. RUDDICK. **Trial Shipments of Cold-Storage Apples.** — *Department of Agriculture, Dairy and Cold Storage Branch,* Bulletin N. 24, p. 17. Ottawa, Canada. **957**

Canada

This is a report of experiments in shipping and marketing, during the late winter and spring months, apples that had been cold-stored. The varieties handled were *Baldwin, Northern Spy* and *Greening.* The fruit was picked from October 25 to November 5, packed and stored during November and shipped from March to May. Shipments were made in chilled chambers in steamships and refrigerator cars on railways. The apples were marketed in Great Britain and Western Canada. The following conclusions are drawn from these experiments: It is highly important to place apples in cold storage as early as possible after being picked; the later apples are picked, within the picking season, the better the colour and keeping quality; if practicable, repacking before storing should be avoided; the season for Greenings may be extended several weeks if the apples are well matured on the trees and placed in cold storage without delay after picking. Apples which are cold-stored promptly after picking and held at 32 to 34 degrees, (0° to 1°. 1 c.) for say five months, then removed to a high temperature for one month, will be in better condition at the end of the sixth month than placed in cold storage for the rest of the period. Or, in other words, exposure to a high temperature just after picking, when the life processes are active in the apple, will cause more injury than the same exposure at a later stage.

958 **French Bye-Laws on the Repression of Fraud.** (Decret portant règlement pour l'application de la loi du 1er Août 1905 sur la répression des Fraudes). - *Bulletin international de la Répression des Fraudes.* N. 27, pp.1-8.

France

A Decree was issued by the President of the French Republic on December 19th, 1910, giving the regulations for the application of the Law of August 1st, 1905, with regard to the products of sugar, chocolate and confectionery factories.

The Decree gives the definition of sugars, glucoses, honey, sweetmeats, jams, jellies, marmalades, cacao, chocolate, liquorice juice, as well as the general dispositions concerning wrappers, packing, labels, etc.

An order of the Prime Minister and of the Minister of Agriculture provides the list of colouring matters which may be used for the colouring of sweetmeats, jams, etc.; and the Minister of Agriculture has published a circular giving the necessary additional instructions for the application of the Decree and the Order of December 19th, 1910.

959 **Repressing Frauds in Rubber Trade.** (Mesures répressives contre les abus résultants de l'adultération du caoutchouc). *Bulletin Officiel du Congo Belge.* 4e année, N. 52, pp. 98-92, Feb. 10, 1910.

Belgian Congo

A Decree of the King of Belgium, of January 16th., 1911, prohibits all trade in adulterated rubber in the Belgian Congo territory.

All rubber which contains foreign substances is considered as adulterated, that is to say, rubber in which the outside aspect is deceptive as to the real value. If it has been coagulated in the form of balls or masses, it is no longer qualified as adulterated when it has been cut through the middle or when it has been manufactured.

All premises in which trade in rubber is carried on are, during the time they are open to the public, subject to be visited by the police, whose duty it is to make sure of the value of the product.

Agricultural Engineering and Farm Machinery and Implements

Agricultural Engineering in the United States. — *Experiment Station Record*, Vol. XXIV, N. 2, Washington, February 1911. **960**

United States

Half a century ago agricultural engineering attracted little attention. Then only a small number of men followed this vocation and there were few institutions which gave instruction in the subject.

The Morrill Act, providing for colleges of agriculture and mechanic arts throughout the United States, has been a great factor in the development of engineering education in the Union. In 1909 there were, according to the report of the Commissioner of Education, a total of 39 748 engineering students in all the universities, colleges, and technical schools of the United States. Of this total number, 17 892 were in the land-grant colleges. These and other data show that the land-grant colleges are training more than 56 % of all the engineering students of the Nation. The main activities of the land-grant colleges are concentrated upon the training of civil, mechanical, electrical, and mining engineers in competition with a large number of State universities and technical schools. In their efforts to train civil engineers for railway corporations, mechanical engineers for industries and hydro-electrical engineers for water companies, these institutions are neglecting to train men for the engineering work of the farm and the country. The movement in that direction dates back but a few years, and as yet only one of the 67 institutions, the Iowa State College, offers a degree in agricultural engineering. Departments of agricultural engineering and of farm mechanics have now been provided in about a dozen of the agricultural colleges, and the men in charge of these departments are illustrating by their work the importance of this subject as a branch of agricultural education. As yet, however, much remains to be done in the way of adequate provision for this subject and in a broader realization of its importance. At the fourth annual meeting of the American Society of Agricultural Engineers held at Purdue University, Dr. S. Fortier, of the U. S. Department of Agriculture, presented a paper setting forth in a striking manner the scope of agricultural engineering and the demand for this kind of training.

An engineering course combining the course of farm machinery and farm motors as now given in the University of Nebraska and the Iowa Agricultural College, of irrigation as now given in the University of California and the Agricultural College of Colorado, of rural architecture and cement work as given in the University of Wisconsin, and of highway engineering as taught in the University of Kentucky, is in large degree lacking. That there is an urgent need for better and more general training for the engineering work of the farm and the country is evidenced by the large interests represented and the relation of the subject to the health and comfort of country living and the business part of farming.

The Census of 1900 placed the value of farm implements and machinery at doll. 761 000 000 and the annual expenditures for new equipment and new machines at over one hundred millions. Since then not only the number of implements and machines, but more particularly the number of motors, has been greatly increased. The great change in agricultural implements, and more particularly the substitution during the past decade of motors for horses and mules, have created a widespread demand for young men possessing a knowledge of agricultural machines and the principles which underlie their construction and use. Knowledge of this subject si now as essential to the farm boy as anatomy to the doctor. The improvement in farm buildings so urgently needed does not call for money so much as a knowledge of how to do things. Out of the same material, and with very little extra labour, may be built a pleasant, convenient, healthy and durable country residence, or the reverse. The main difference is one of plan and execution.

Farm sanitation is of even greater importance. The farm water-supplies in one State have recently been investigated by Kellerman and Whittaker, of the U. S. Department of Agriculture, in cooperation with the Board of Health of the State in question. Out of 79 carefully selected and typical rural water-supplies, 20 were found to be good and 59 were polluted, the chief cause of the pollution being carelessness or ignorant management.

Another point of great importance is the management of country roads According to statistics gathered by the office of Public Roads of the U. S. Department of Agriculture, only 8.2 per cent of the 2 151 570 miles of roads of the country are inproved, *i. e.* surfaced with gravel, with stone or with special material. Public sentiment in favour of better roads is rapidly spreading among farmers. American farmers can not afford to pay on an average 23 cents to haul a ton a mile when 10 cents would suffice if the highways were improved. The States which have decided in favour of better roads would receive much more benefit from their expenditure if the agricultural colleges had seen fit to establish good courses in highway engineering.

The improvement of marsh and overflowed lands also demands a larger knowledge of agricultural engineering.

C. G. Elliott, chief of drainage investigations of the U. S. Department of Agriculture, has submitted a report to Congress on the unreclaimed swamps, overflowed and wet lands of the United States. He estimates the extent of the permanent swamp land at 52 665 020 acres, of wet grass land at 6 826 019 acres, of periodically overflowed lands at 14 747 805 acres, of periodically swampy lands at 4 766 179 acres and of occupied farm lands needing drainage at 150 000 000 acres, a total of 229 005 023 acres. Each State in the Union is in need of drainage, from 8 000 acres in Rhode-Island to nearly 20 000 000 acres in Florida.

Of even greater importance is the subject of irrigation. Two fifths of the United States is arid and the remaining three fifths although humid are subject to periodical droughts during which crop failures can only be averted by artificial watering. In the past 10 years nearly 16 000 000 people have been added to the population of the United States. The public lands suitable for cultivation in their natural state have been taken up, and the farms for the future millions must be wrested from the desert by irrigation or from the swamps by drainage.

Of this desert land about 13 000 000 acres have been reclaimed by irrigation, but the waste of water is so great at present that from 50 to 100 per cent more land might be reclaimed if the farmers were assisted by trained specialists.

Taken as a whole, the land-grant colleges may be said to have expended little effort or money in training specialists for the engineering work of agricultural communities. Unless the curricula of the engineering courses of these institutions are modified there is certain to be overcrowding in the older branches of the engineering profession. Meanwhile progress in agriculture and the improvement of rural districts are being immeasurably retarded through the lack of competent agricultural engineers.

961 ACH. GRÉGOIRE. **Agricultural Machinery in the United States.** (Les machines agricoles aux États Unis). *Revue économique Internationale*. N. 2, pp. 395-411. Bruxelles, 15-20. févr. 1911.

United States

In the domain of agricultural machinery, as in so many others, the United States holds a prominent place, both on account of the importance of its production and the quality of its products.

The invention of reaping machines is the crown of the achievements of American agricultural mechanics. It is these machines which have made the great development of agriculture possible in the United States and in all new countries.

Among the typical qualities of the American agricultural machines, the marked predominance of cast iron and of malleable cast iron, in comparison with the European products, is the most noticeable.

The machines are reduced to the minimum weight, whilst preserving the necessary resistance. A large number of apparatus are furnished with devices for preventing the breaking of important organs. This result is obtained by a connection (rubber or spring), or one which is easily replaced (wooden pin) between the body and tool. A further step has even been made in this direction by the creation of elastic implements (such as cultivators with spring blades, etc.).

The machines are composed of interchangeable pieces. As hand labour is very costly, every effort is made to save expense.

This has been the reason for the construction of multiple ploughs, large reaping, drilling, and threshing machines and also for the general custom in America of mounting the drivers on the machines. They are less fatigued in this way, and there is less reason for the machine to be stopped at intervals. Another consequence has been the improvement of the implements properly so called.

By the use of raw material of a superior quality and by a careful study of the form, the Americans have been able to reduce the weight of these tools by from 80 to 90 %, and in this way to increase considerably the useful output of work by the labourer. These American tools may be described as veritable works of art. They have been furnished with ball or roller bearings, with break springs, etc. Steel has been substituted for iron in the case of parts subject to much wear and tear; thus the mould boards of chilled ploughs are made by welding two plates of steel to the two surfaces of a sheet iron plate, and the surface is afterwards tempered.

The *International Harvester Company*, the largest constructors of mowers, reapers and binders, has its headquarters at Chicago. It has mines of its own, and forests for the production of wood, its own foundries and steel works. It possesses 15 factories in all, which send out yearly 700 000 agricultural machines, of the value of about 78 000 000 dollars (401 700 000 fr.). The construction of agricultural machinery is becoming more and more localised in the centre of the United States, Illinois alone contains 41.5 % of the factories in the Union.

The National Implements and Vehicle Association of the U. S., whose annual business is 900 000 000 dollars, unites manufacturers and retail dealers. Its object is to carry out the progress of agricultural mechanics from the commercial point of view.

The enormous areas still to be brought under cultivation in the United States (about 1 840 000 000 hectares), the 28 gigantic irrigation projects, which will benefit 3 000 000 acres and provide for the creation of 167 000 farms, and the « Dry Farming » in the West of Missouri, will lead to a further development of the agricultural machine industry.

Steam tilling, as known in Europe, is but little adopted, but much attention is being given at present to the study of motor traction of ploughs.

The following are statistical data for the sale of agricultural machinery in 1909:

Reapers, mowers and binders	13 073 004	dollars
Ploughs and cultivators	4 804 185	»
Other implements	9 419 539	»

The United States have practically acquired the monopoly for the construction of harvest machines. The main clients of the American factories in 1909 were :

Argentina	5 071 972	dollars
Russia	1 806 165	»
France	3 727 531	»
Canada	2 587 929	»
Germany	1 515 215	»
Australasia	1 058 280	»
England	795 584	»

962 V. Magerstein. **Electric Wind Motors in Danish Agriculture.** (Die Windelektrizitätswerke in Dänemark). — *Monatshefte für Landwirtschaft.*, IV. J., 2 H., pp. 35-40, figs. 3, Wien, Feb. 1911.

Denmark

Mr. Magerstein deals with experimental electrical wind plant which has been set up at the suggestion of Prof. Paul la Cour, with the support of the State. The greatest difficulty encountered was that of connecting the wind motor to the dynamo, but it was surmounted, and there has been a considerable extension in the application of electric generators to wind-mills for domestic and agricultural use. In Denmark at the present moment, in addition to the State installation at Askov, there are 100 electrical wind motors, 30 of which are in full work. The interest felt in the utilisation of this atmospheric energy gave birth to the Association,« Dansk Vindelektrisitet Selkab, » which was founded in 1903 and numbers more than 300 members; and the newspaper, *Tidsskrift for Vindelektrisitet*, started in 1904.

An electric wind motor includes the wind motor with 4 or 6 wings, a dynamo, a battery with automatic accumulators on the La Cour system, a good switchboard, and an automatic tension regulator for light. Up to the present, however, the electric wind motors have given but a poor return, which makes it necessary to put up central installations, which will be done mainly by the Association. The cost being the same, however, the independent motor is preferred.

The installation expenses are as follows: for a farm with 40 incandescent lamps and a 3 to 5 HP motor, £ 294; for two farms with 80 lamps and a 7 to 8 HP motor, £ 438 ; for a village with 300 to 500 lamps, several motors and a reserve of 10 HP, £ 905.

MAX RINGELMANN. **Agricultural Traction Engines.** (Les Tracteurs agricoles) — *Bull. Mensuel de l'Office des Renseignements agricoles.* N. 12, p. 1449. Paris, 1910. 963

France

Numerous experiments made with ploughs and harrows from different countries and of every type (simple, double, double reversible, sulky Brabant ploughs, balance ploughs, Bajac ploughs, ploughs on two wheels, Ventzki tilling machines, Fondeur's double Brabant plough, Bajac tilling machines and Norwegian harrows) have led the Director of the Machine Trial Station at Paris to affirm that the power of traction machines must not be calculated according to the average efforts but according to the maximum efforts that they have to make. This maximum effort varies between 110.55 and 157.7 % of the average effort, and for 2 to 27 % of the total course.

The following figures have been obtained with animal traction:

				kg.
Average	traction	power	required	100
Maximum	»	»	»	133 to 135
Exceptional	»	»	»	260

Mr. Ringelmann therefore recommends, in the construction of auto-motors, that their power and grip on the soil be so calculated that 7/4 of the average required effort may be exacted from them at any given moment.

Petters' Oil Traction Engine. — *The Engineer.* Vol. CXI, N. 273, p. 89. London. January, 27, 1911. 964

Great Britain

A new type of oil traction engine has been introduced by Petters, Limited, of Yeovil.

The motive power is a 30 brake horse-power horizontal oil engine. It is mounted on a steel channel frame, or under carriage, laminated springs being provided for both front and rear axles. It has one cylinder $10\frac{3}{4}$ in. (27.3 centimetres) in diameter, by 12 in. (30.48 centimetres) stroke, and its normal rate of revolution is 300 per minute. The oil inlet is of the firm's patented adjustable type for using ordinary paraffin oil or crude oil.

The travelling wheels are of the standard English traction engine design. The diameter of the driving wheels is 60 in, (153.4 centimetres) and of the front wheels 40 in. (101.6 centimetres), and as ordinarily supplied, the width of these is 11 in. (27.94 cm.) and 6 in. (15.24 cm.) respectively. When, however, the engine is required for ploughing or for working on agricultural land, the makers recommend wheels of the same diameters, but 20 in. (50.8 cm.) and 10 in. (25.4 cm.) wide respectively.

The tractor is designed to haul loads of from 10 to 18 tons (101.6 to 182. 88 metric quintals) gross weight, but much heavier loads can be drawn over good roads. It will draw and operate a thrashing machine, saw bench, corn grinder, chaff cutter, or other machine, in the same manner as does a steam traction engine. The machine is also intended, when provided with the especially wide travelling wheels, for ploughing and cultivating and for all those classes of agricultural machines, which are drawn behind the tractor.

The weight of the empty machine (*i. e.* without oil or water) is 5 tons (50.8 metric quintals) and its weight when packed for export is 7 tons (71.12 metric quintals).

965 **The Gerstl Funicular Traction System for Harvesting Beets.** (Rübenernte mittelst der Gerstlschen Seilwinden für Gespannkraft samt gleichzeitiger Abfuhr der Rüben aus dem Felde). *Oesterreichisch-Ungarische Zeitschrift für Zuckerindustrie und Landw.* XL, J., I. H., pp. 41-47, figs. 5, Wien, 1911.

Germany

Experiments have been made this year for the first time on a large scale in Austria-Hungary, with the Gerstl funicular pulley system built by Rud. Sack for harvesting beets.

The system has two cables and two horizontal movable and fixable pulleys, or 4 cables and 4 pulleys.

One draught-animal attached to the winch, maintains an equilibrium against 10 animals yoked directly to the machine but can only do the same amount of work per hour as 2 or 3 of such animals, because when directly yoked to the machine, draught animals can move it four times quicker than if they are attached to the winch.

Thanks to this means of funicular traction, the various machines for gathering in the beet crop, which are so complicated and call for so much traction effort, can be used much more extensively, thus marking a notable progress in the mechanical harvesting of beets.

Experiments with the Motor Plough of the German International Harvester Company. (Erfahrungen mit dem Motorpfluge der Deutschen International Harvester Company). — *Deutsche Landwirtschaftliche Presse*, Berlin, Feb. 4, 1911. 966

Germany

The motor plough has already been tried in Prussia; a specimen machine has tilled nearly 1000 *morgen* (about 250 hectares).

This plough cultivates about 20 or 30 morgen a day and harrows them with a disk harrow to a depth of 2 or 3 inches; it ploughs 13 to 20 morgen per day, according to the season and the conditions of the soil with 3 to 5 shares to a depth of 8 inches.

The work is perfect, on account of the independence of each plough-share, enabling them to adapt themselves to the irregularities of the surface.

Either benzol or benzine or " antin " may be used in the motors.

The machine costs 17 000 marks (21 250 fr.), while the tilling of a morgen of land costs under 5 marks (6.25 fr.) everything included.

SCHURIG. Experiments with the Stock Motor Plough. (Meine Erfahrung mit dem Stockschen Motor-Pflug). — *Deutsche Landwirtschaftliche Presse*, Berlin, Feb. 1, 1911. 967

Germany

Mr. Schurig has tilled nearly 3000 *morgen* (750 hectares) with a Stock motor plough.

This machine weighs 40 quintals and costs 15 000 marks; it may be used to till as much as 15 000 *morgen* without needing any radical repairs, and only one man is needed to work it. From 2 ½ to 3 *morgen* per hour can be tilled with it.

In spring, the motor may also be used to draw rollers and harrows, thus covering more ground.

The expenditure per *morgen*, including interest, depreciation, fuel, etc., varies from 3 to 3 ½ marks.

968 **New " Unterlip „ Machines for the Cultivation of Potatoes.** (Neueste Unterlip'sche Kartoffelkultur-Maschine). — *Deutsche Landwirtschaftliche Presse,* N. 12, p. 130, Feb. 11, 1911.

Germany

Unterlip has constructed two new machines for the cultivation of potatoes, which are complementary. One makes the holes for planting the potatoes, and the other, which follows the first, fills up the holes and banks the earth.

The first consists of a cart attached behind a horizontal shaft, on which 5 screws, each furnished with 4 five-bladed diggers, revolve vertically. When the machine is set in motion, it digs 4 holes in the soil at equal distances from each other, and each complete turn of the screw gives 20 holes. The second machine is furnished with disks which fill up the holes and bank up the earth.

The two machines cost together about 700 marks (875 fr.).

969 E. Delorme. **The Souchu-Pinet Vine Ridge Hoes at the General Agricultural Exhibition at Paris.** (Les Houes décavaillonneuses de Souchu-Pinet au concours général agricole de Paris). — *Revue de Viticulture,* N. 898, pp. 250-252, Paris, mars 2, 1911.

France

Mr. Souchu-Pinet, of Langeais, sent some ploughs and vine ridge hoes (1) for the better cultivation of the vine, to the General Agricultural Exhibition at Paris, in February, 1911. He gives a detailed description of them, with figures.

A great deal of attention has been paid to these apparatus; they work very well and are of great service to the vine-grower on account of the economy which they enable him to effect.

970 Wardenburg. **Sowing Apparatus for Attachment to Side of Plough.** (Säevorrichtung seitlich am Pfluggestell angebracht. Patent Wardenburg). — *Deutsche landwirtschaftliche Presse,* N. 11, p. 117, Berlin, Feb. 8, 1911.

Germany

Mr. H. Wardenburg (Oldenburg) has just constructed a sowing-apparatus which can be attached to the forecarriage of a wheel plough. A box containing the seed is affixed to the axle of the right hand wheel; the rotation of the latter causes a toothed disk inside the box to revolve and the seed to fall.

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(1) In S. W. France, the name " cavaillon " or " chavaillon " is given to the strips of soil left untouched by the vineyard ploughs, and which are broken up by special hoes, " houes décavaillonneuses ". [*Ed.*].

971 A. J. HANSEN. **Experiments with Potato Harvesters.** (Kartoffelbau in Dänemark) *Illustrierte Landwirtschaftliche Zeitung*, 31 J., N. 17, pp. 157-158, Figs. 3. Berlin, March 2, 1911.

Denmark Although mangolds are preferred in Denmark to potatoes for the production of milk, the Experimental Stations of the State have nevertheless undertaken a series of experiments on the cultivation of potatoes: the varieties to be cultivated, their size, the period when they should be sown, the planting of whole and cut tubers, and the different periods and depths at which they should be planted.

The experiments made by the Danish Society of Agriculture with different machines for gathering crops are very important:

Machines	A man collected 12 500 kg. per 0.5 ha. in	After the machine gathering, there remained in the ground
1. Harder's original	46 hrs.	5.3 % of the crop
2. Nordstens	52 »	4.7 » »
3. Caledonia	41 »	9.6 » »
4. Aadals Bing	52 »	9.5 » »
5. Allan	43 »	4.5 » »
6. Graf Münster	46 »	8.0 » »
7. Parisa	36 »	1.9 » »
8. Shaker	69 »	3.1 » »
9. Rud. Sacks	61 »	3.2 » »
10. Büchtrups Fingerrad	51 »	5.8 » »
11. Oliver (plough)	58 »	1.6 » »

The potatoes gathered had been carefully planted in holes made by a machine.

Further improvements in potato harvesters will certainly tend to the increased cultivation of potatoes.

972 R. DESSAISAIX. **Vallotton Automobile Mower.** (Faucheuse automobile Vallotton). — *Journal d'Agriculture pratique*, 75e année, No. 9, pp. 271-273, Paris, Mars 2, 1911.

Switzerland Mr. Vallotton, engineer-constructor at Geneva, has invented an automobile mower which differs from others in so far that any mower that is already on the farm may be transformed into the automobile mower, and at the same time into a motor. The mower transformed in this way, with a 5 HP. motor, weighs only about 625 kg., and there is therefore no risk of its sinking in the soil.

By removing the blade carrier and the blade crank the apparatus may be transformed into a small motor which, with the aid of a leathern strap, may be used as a power engine for any machine on the farm.

With a one cylinder motor of from 4 to 5 HP. the transformation costs about 2500 frs. (£ 100) while with a 2 cylinder motor, of 8 to 10 HP., the cost is 3400 frs. (£ 136).

973 **The Bajac Rick-Mould Waggon.** (Le Chariot-moule de Bajac). — *La Nature*, N. 1971, p. 107 du suppl. Paris,, 4 Mars 1911.

France This waggon, which is for making hay-ricks, resembles a vast circular cage made of wooden uprights fixed to the frame and bound together by a metal trellis work. The frame rests on six wheels, and the bottom of the cart is made of two longitudinal bars fixed in front of the frame and simply supported at the back by hooks; these are further supported by two transverse bars held by strong levers. The waggon can be turned in the field with as much ease as a carriage.

The rick-builder stands inside the waggon, and has only to regulate the hay as he receives it and to pile it up. In a quarter of an hour, four labourers can build a stack of 450 bundles. As soon as the stack is finished the waggon is moved to where the hay is to stand: the levers are loosened and the transverse bars fall to the ground; at the same time the two back panels are opened and the ends of the two longitudinal bars are thus released; the team harnessed to the waggon is set in motion and the rick remains on the ground in the regular form given to it by the mould.

J. LEROU. **Filters and Presses at the General Agricultural Exhibition in Paris.** (Les filtres et les pressoirs au Concours Général agricole de Paris). — *Revue de Viticulture*, N. 898, pp. 243-247. Paris, 2 Mars 1911. -974

Among the new wine-growing apparatus exhibited at the General Agricultural Exhibition in Paris, in 1911, Mr. Lerou mentions the following: the cellulose filter *Simplex*, constructed by David Rojat of Nîmes and intended especially for the filtering of wines. Cellulose is so very porous that a square metre surface of this substance is equivalent to 80 m² of rolled tissue. The same firm has also constructed a polyfilter *Terminus*, especially for white wines. Fran

The *Salvator* is a filter capable of clarifying large quantities of wine; it consists of cloth filters hermetically closed in metal cylinders. The apparatus is very easy to clean.

The *Méran* filter has been especially constructed by Mallié for the filtering of samples which have to travel under unfavourable conditions; it is made on the same principle as the apparatus for work on a large scale.

The multi-filter *Gasquet*, of Bordeaux, is made in one size only; when the quantity of wine to be filtered is larger than can be treated by this apparatus, the number of filters is increased, and it is to this fact that the advantages of the various filtering combinations are due.

Among presses, the hydraulic press Victor Coq, of Aix-en-Provence, which is made with movable draining trough, may be mentioned. The compression pump is easily set in action by a ½ HP motor.

Messrs Guy and Mital, of Lyons, exhibited a press system which is an improvement on that universally known under the name of "multiple differential lever press". Mabille has exhibited a new motor governing device for the press "Le Moto Universel", by which all existing hand power apparatus can be transformed at a small cost.

975 R. Mallet. **Lamp-snares and various Apparatus at the Paris Agricultural Exhibition.** (Les lampes-pièges et appareils divers au Concours agricole de Paris). — *Revue de Viticulture.* N. 898; pp. 248-250, Paris, 2 mars 1911.

France Mr. Mallet describes the Olimpia lamp-snare, constructed by André Rebattet, of Paris, for the destruction of injurious insects and especially of Cochylis. The Alexander " Acetyle Radius Insect Snare " has been constructed for the same purpose.

Mention may also be made of the Simon Brothers' crushers, Mr. Garnier's horse-spade, toothed thrasher and horse-rake.

976 R. Brunet. **Pumps and Sprayers at the General Agricultural Exhibition in Paris.** (Les pompes et les pulvérisateurs au Concours général agricole de Paris). — *Revue de Viticulture.* N. 898, pp. 241-243; Paris, 2 mars, 1911.

France Mr. Petit's « Mouvex » pump has its parts liable to friction in the slightest degree, and thus avoids the inconveniences of pinion and piston pumps.

The Guillebeaud pump, the « Insatiable », has been made for dense liquids, such as wine must, and beer and cider wort. The parts likely to become choked up may be examined with ease.

The description is also given of the Goudicheau sprayer, mounted on two wheels and carrying two series of jets, one to the right and the other to the left.

The Villepigne sprayer allows the worker the freedom of his hands. The receptable contains compressed air at 3 to 4 atmospheres, and the labourer has no need to work a pump. This apparatus has been tried for the control of the Cochylis.

977 H. A. Harding, J. K. Wilson & G. H. Smith. **The Modern Milk Pail.** — *New York Agricultural Experiment Station.* Bulletin N. 326, pp. 250-281, pl. IV. Geneva, N. Y., December 1910.

United States More than one-half of the infection that milk receives during the milking process can be prevented by the use of a covered pail.

The most common failing of covered pails is their excessive height. For short-legged or heavy-uddered cows the pails should not be more than 30 cm. high over all. An elliptical opening is preferable to a round one covering the same number of square cm. since it is easier to milk into it. Though a smaller opening may be used, cm. 12.5 by 17.5 will be found practically convenient. The cover should be sufficiently convex so that the entire inside of the pail can be seen and easily reached for cleaning. Such a pail is inexpensive, durable and one of the most effective in keeping bacteria out of the milk.

F. BOCCHIALINI. **A New Machine for Working "Grana" Cheese by Steam** (Un nuovo apparecchio per la lavorazione del *grana* a vapore). — *L'Avvenire agricolo*, Anno XIX, N. 2, pp. 53-55, Parma, Feb. 28, 1911. 978

Italy

The heating of milk for the making *grana* or Parmesan cheese in boilers with direct fire costs from 20 to 26 centimes per hectolitre of milk, while steam heating in double boilers, costs only 12 centimes. In addition to this economy, steam-heating offers other well known technical advantages.

Two machine makers of Parma have invented a further improvement of this system. In their apparatus the boiler is simple while the agitator, on the contrary, is hollow; it is in the form of 3 flattened globes joined together by a tube, and steam circulates in it; the steam is not produced by a special generator, but the waste steam from the motor which works the churns and other machines of the dairy is utilised for the purpose.

When the milk has reached the desired temperature, the agitator is automatically raised, thus avoiding all danger of overheating, or otherwise deteriorating the curds, much more satisfactorily than can be done with the steam jacketed boiler.

This apparatus has already been used for a year in a cheese dairy with the best results.

979 **A German Knife for Tapping Rubber Trees.** (Ein neues deutsches Zapfmesser). — *Gummi Zeitung*, 25 J., N. 16, pp. 577-578, Berlin, Jan. 20, 1911.

Germany

This is the "Latextor"; constructed by Esser of Hamburg. It is composed of two knives fixed together, the points of which may be made to converge towards a given point of the tree by the action of a spring. The depth of the incision is regulated automatically.

Experiments have been made with this implement, which has given the best results and appears to be very practical.

PLANT DISEASES

NOXIOUS INSECTS AND OTHER PESTS

INTELLIGENCE

Non Parasitic Diseases of Plants and their Control.

C. Fuschini. **Stringiness or *Filosité* in Potatoes.** (Conseguenze culturali della " Filosità " delle patate. Saggio preliminare di esperienze comparative). — *Estratto dalla Rivista Organo della R. Scuola di Viticoltura e di Enologia e del Comizio Agrario di Conegliano*, Anno 1910, N. 20. Conegliano, 1910. **980**

Italy

In the asexual reproduction of potatoes, it is now admitted that the selection of tubers is no less important than the choice of seed. The right course is to begin the selection while the potatoes are still in the field, and finish it when the whole crop is gathered, in order to eliminate all the injured or abnormal tubers.

M. Fuschini draws special attention to that diseased condition of potatoes known as *Filosité*, or in Germany as the *Fadenkrankheit* (Stringiness) (1).

Its effect is to render the surface of the tubers wrinkled and shrivelled; or else they keep the consistence of tubers recently dug up, but have small eyes, whence emerge slender shoots like fine filaments. These abnormal tubers are called " male ", as opposed to the normal ones, known as " female ".

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(1) In the West of France the tubers which show " filosité " are called " mulas " (mules) or " male potatoes "; they are also called " fileuses " (stringy) potatoes; the term " female potatoes " is reserved for normally developed tubers. Cf. G. Delacroix: *Maladies non parasitaires des plantes cultivées*, p. 304, Paris, 1908. [*Ed.*].

The comparative experiments carried out last year with " male " and " female " tubers of the " *Fucense* " variety gave the following results, calculated per hectare (2.47 acres):

POTATOES	Date of planting	Weight of tubers planted qls.	Date of digging up	Weight of leaves and aerial stems qls.	Total weight of tubers qls.	Waste tubers qls.	Saleable tubers qls.	Average weight of saleable tubers grs.
Normal Tubers . .	March 14	22	Aug. 5	77.88	212.08	29.04	183.04	96
Stringy Tubers . .	»	27	»	64.68	150.48	32.50	117.98	67

These figures evidence the great inferiority of tubers affected with stringiness.

There are two ways of eliminating the " male " tubers from the potato field:

1) By not using for reproduction those tubers where the epidermis is wrinkled and less firm to the touch, and expecially where, relatively to the variety they belong to, the eyes are small.

2) and this is much the best method — raising the temperature, and thus forcing the development of the shoots from the tubers, in order to see (and for this purpose the shoots need not be longer than half a centimetre) which tubers are growing normally and which abnormally. The latter should be rejected, and the former can be planted without any thing to be feared from forced germination.

981 K. Dorph-Petersen. **Modifications of the Roots of Swedes and Turnips.** (Kaalroens og Turnipsens Bastarder). — *Ugeskrift for Landmaend,* Aarg. 56, N. 2 pp. 17-19. Kobenhavn, 12 Januar 1911.

Denmark

Roots of swedes and turnips which are more or less modified, occur fairly frequently in fields. Large outgrowths, knobs etc., sometimes cover the whole surface of the roots, deteriorating the value of the crop.

According to Helweg, these excrescences are due to cross-fertilization between swedes and turnips. The outgrowths much resemble the " finger and toes " caused by *Plasmodiophora*, but are easily distinguished from them by:

a) roughness of surface;

b) absence of suberaceous hypertrophy;

c) absence of reddish grey fibres which disengage themselves from fresh sections, and betray the presence of the Myxomycete.

982 F. Lilienfeld. **Krupuk, a Disease causing Anomalous Leaves in *Nicotiana Tabacum* and *Corylus Avellana* (var. *laciniata*).** Ueber eine Anomalie des Blattgewebes bei *Nicotiana Tabacum* und *Corylus Avellana* var. *laciniata*. (Anz. Akad. Wiss. Krakau Mathemat. Klasse. Série B, 7, pp, 714-719. 2 Tafeln. 1910). *Botanisches Centralblatt* Bd. 116, N. 10, p. 260, Jena, 7 März, 1911.

Java

Raciborski observed in Java, upon the lower surface of the leaves of *Nicotiana Tabacum* large dark-green swellings, which caused irregular folds in the blade, rendering the leaves useless for the outer leaves of cigars. The disease is called in Java, *Krupuk*. Seeds of the infected plants were sown; the first generation showed no signs of the swellings, there was no opportunity of observing the second.

But the anomaly appears to be neither hereditary nor contagious. The outgrowths were caused by groups of palisade tissue occurring where, normally, no mesophyll exists. The same kind of swellings were found on *Corylus Avellana*, var. *laciniata*, but had here the form of slight ridges, which did not attain to folds. They also are due to an unusual growth of palisade-tissue.

983 **The Premature Dropping of Figs in Orchards of N. Carolina** — (Experiment Station Work, 471), U. S. Department of Agriculture. *Farmer's Bulletin* 430, pp. 24 (7). Washington, February 6, 1911.

United States: N. Carolina

There are many fig trees in North Carolina and in other States which would produce several bushels of fruit every season if it could grow to maturity, but when about two-thirds grown the fruit turns yellowish, begins to shrivel, becomes dry and tough, and then drops. With the first crop it all drops within a few days; while with the second the dropping extends over a long period, each fruit falling as soon as it reaches a certain size or stage of maturity.

Professor Reimer finds that wherever the dropping is at all serious the trouble is due to the variety. Fully 95 per cent of the figs examined by him at the North Carolina Station were true Smyrna seedlings and of no value for culture in the South, since the flowers of these seedlings must be fertilized by the flowers of the wild fig or caprifig; otherwise the fruit will shrivel and drop off before maturing. Thus far neither the caprifig nor the *Blastophaga grossorum* has been successfully domesticated in the United States, except in the warmer sections of California, where the Smyrna fig industry is being developed to a considerable extent.

The *Brown Turkey* and the *Celestial* varieties of fig have thus far proved to be the best in the latitude of North Carolina.

984 O. Butler. **Gummosis of *Prunus* and *Citrus* with Observations on Squamosis and Exanthema of the *Citrus*** — *Annals of Botany*, Vol. XXV, No. XCVII, pp. 107-150, plates VII-IX, 3 figs. London, January, 1911.

Great Britain

This study consists of three chapters on the "Gummosis" of *Prunus* and *Citrus*, the "Squamosis" and "Exanthema" of *Citrus*, each contains a brief historical resumé, together with a description of the symptoms of the disease, and a very minute histological examination of the infected parts. The chapters conclude with an account of preventive and remedial measures.

Gummosis:

The gum-diseases of *Prunus* and of *Citrus* are histologically similar maladies, and are produced by the same causes. No species in either genus is entirely immune from the disease, but their susceptibility varies.

Amongst the most resistant species are *C. amara* and *C. trifoliata*, while *C. Limonum* always falls a victim to infection.

Gummosis is due to hydrolysis of the walls of the embryonic wood cells. The dissolution of the cell-wall begins in the secondary lamella and, almost coincidently, in the primary membrane, the dissolution of the third lamella proceeds centripetally, and with its final destruction, the cell contents become a part of the gum-mass.

Starch and the cell contents play no part in the gum formation.

The secondary lamella of the wood fibres, and that of the vessels, as well as parenchymatous tissue may show gummous degeneration, in severe cases of gummosis, where they are near the zone of active development of the malady.

Gummosis develops autogenously, and is produced by all manner of traumatisms, provided they act directly, or indirectly on the cambium.

Once incited, the simultaneous concurrence of two conditions is necessary for the development of the disease:

1) Active growth of the cambium;

2) An abundant supply of water available to the roots.

Preventive and Remedial Measures:

Careful drainage, the choice of resistant stocks, removal of the dead bark, and the covering of tissues thus exposed with shellac, etc.

Squamosis:

This disease is at present only known in the citrus groves of S. California and Florida. It is primarily a disease of the orange-tree, its characteristic symptom being the scaling of the bark. The area of infected tissues gradually girdles the trunk or branches; if it starts in the former, the tree may live some years, but if in the smaller limbs, chlorosis sets in, and the branch dies. Little is known regarding remedial or preventive measures.

Exanthema:

The malady develops in California, either on very permeable granitic soils or on shallow clay soils underlaid by an impermeable subsoil.

In Florida, it occurs on sandy, permeable dry soils.

On the nodes, and rarely on the internodes of young branches, numerous swellings occur; pustules break out afterwards on the internodes.

On the older branches, there are no nodal swellings, but often numerous pustules containing gum. Often a marked proliferation of young buds occurs, which may develop into short branches with chlorotic foliage, thus producing a pseudo-witch's-broom effect.

A luxuriant growth and deep green colour of the foliage precede the first symptoms of the disease, then the shoots become yellowish-brown and die back.

The best preventive measures are, avoidance of excess of nitrogenous manures, the use of green manure crops as the source of the necessary nitrogen, and frequent, but moderate irrigation.

985 **Damage by Floods in the Forests of Germersheim, in the Palatinate.** (Hochwasserschäden in den Staatswaldungen des Kgl. Forstamtes Germersheim). — *Naturw. Zeitschrift für Forst und Landwirtschaft*, 9. Jahrgang, Heft 3, N. 4, S. 198-200. Stuttgart, 1911.

Germany: Bavaria

The Robinias must be reckoned amongst the trees which suffered most from the action of the water, which in times of flood invaded the wooded ground situated near river-banks. The cortical tissues were attacked, and the cambium destroyed, thus causing the death of the trees.

The maples and ashes were more resistant, especially the American ash, *Fraxinus alba.*

Oaks, elms, poplars and willows showed the most resistance.

Parasitic Diseases of Plants.

Generalities. — Parasitism. — Bacteria and Fungi as Parasites and Saprophytes. — Control.

986 B. Palm. **New Contribution to the Mycological Flora of the Environs of Stockholm.** (Nye Bidrag till Stockhelms-traktens Svampflora). — *Svensk. bot. Tidskr.*, IV, pp. 1-8, Stockholm., Jan. 1910. — *Botanisches Centralblatt*, Bd. 116, N. 10, p. 257. Jena, 7 März, 1911.

Sweden

The above contribution to the mycological flora of the neighbourhood of Stockholm mentions no less than 140 parasitic species, some of which have been discovered on new host-plants, viz, *Ochrospora Sorbi* (Ouds.) Dietel, on *Amelanchier canadensis*, and *Synchytrium Potentillae* (Schröt.) Lagerh. on *Potentillae Tormentilla.*

Vain endeavours have been made to infect *Linum usitatissimum* with uredospores of *Melampsora Lini* from *Linum catharticum*; for this reason, it is proposed to consider the *Melampsora* on *Linum usitatissimum* as an independent species under the name of *Melampsora liniperda* (Körn.) Palm.

987

A. A. Elenkin. **Short Report of the Phyto-pathological Researches carried out during the Summer of 1910 at Mikhailovsk.** (*Gov. of Moscow, Podolsk district*). Kratkii Otciët o Fitopatologhitceskikh Issliedovaniiakh V selie Mikhailovskom (Moskovsko. Gub. Podolskago Uiesda) V Tetcenie Lieta 1910. — *Journal Boliesni Rastenii* (*Journal of Plant Diseases*) IV G., pp. 137-140, St. Peterburg, 1910.

Russia: Moscow

During June and July, white patches were found on the leaves of cultivated strawberries; the spots were due to a fungus, *Mycosphaerella Fragariae* (Tul.) Lind.

Later, red patches occurred and on these, in August the fructifications of *Marssonia Potentillae* (Desm.) Fisch., f. *Fragariae* (Lib.) Ohl, appeared forming numerous small black groups. This fungus was discovered by Ohl in Russia, and it occurs in Finland on wild individuals of *Fragaria vesca*.

Equally interesting is the discovery of *Atichia glomerulosa* (Ach.) Flot., which almost covered the foliage of a Picea in the park with a blackish granular growth. Some of the birches suffered much from the attacks of the vegetative form of a Polyporea, (probably *Polyporus nigricans*, Fr.) which caused the rotting of the woody tissues.

Finally, while the pines of the park were injured as a whole, by *Peridermium Strobi*, (Kleb.), in the orchard, the leaves of the black currant bushes were covered with uredospores and teleutospores of *Cronartium ribicola*, Dietr., which belongs to the life-cycle of *Peridermium.*

Amongst harmful insects may be mentioned *Pineus sibiricus*, (Chldk.) C. B., which causes the young buds of the cedar to wither, and *Coleophora laricella*, Hbn., which attacks the leaves of the larch.

988 F. G. STEWART. **Note on New York Plant Diseases.** — *New York Agricultural Experiment Station.* Bulletin No. 328. December, 1910. p. 305. Geneva. N. Y.

United States: N. York

This bulletin contains brief notes on various plant diseases and malformations observed in New York during the last ten years. The principal items are as follows: Bitter rot of apples is a rare disease in New York, Crown gall is an unimportant disease of apple trees. Double, and even triple, apples occur occasionally. Apple leaves affected with scab are particularly liable to spray injury. Apple rust (*Gymnosporangium* spp.) is practically unknown to New York fruit growers except in the Hudson valley and on Long Island. The powdery mildew attacking apples in New York is *Podosphaera leucotricha.* It is common in nurseries and sometimes occurs even on bearing trees in the orchard. The Florida San-José-scale fungus has been found on apple trees on Long Island. Veneer tree protectors may seriously injure apple-tree trunks if left on the trees continuously. The period of incubation for *Puccinia Asparagi* is probably less than three weeks. On Long Island, string beans have been found attacked by powdery mildew.

The beech and other deciduous trees in the vicinity of Seventh Lake, Adirondack Mountains, are much injured by *Fomes igniarius* which causes heart-rot. *Fomes fomentarius* is exceedingly common in the same region. Sporophores of *F. fomentarius* often change their direction of growth owing to the falling of the trunk on which they are growing. Sometimes *Fomes pinicola* occurs on beech and maple. *Cercospora beticola* may be transmitted with the seed of sugar beets. *Phyllosticta Betae* has been found on leaves of sugar-beet at Flint. Begonia leaves are occasionally attacked by powdery mildew and eelworms. *Calyptospora Goeppertiana* occurs on species of Vaccinium in New York. Box-tree cuttings which fail to root are covered with *Phoma stictica.* The leaves of red cedar branches attacked by *Gymnosporangium nidus-avis* are like those on young trees; that is to say, the attack of the fungus brings about reversion to the juvenile form. *Sclerotinia fructigena,* in the Monilia stage, kills cherry blossoms and twigs. *Sclerotinia Seaveri,* in its conidial stage, kills many leaves and twigs of *Prunus serotina. Exoascus Cerasi* occurs occasionally on cultivated cherry trees, particularly on Long Island. The cherry *Gov. Wood* appears immune to *Podosphaera Oxycanthae*. *Cylindrosporium Padi* may attack the fruit of *Prunus virginiana*. The spore masses of *Pilobolus crystallinus* on chrysanthemum and rose leaves have been observed. *Erysiphe Cichoriacearum* has been found on a new host: *Coreopsis tinctoria*. Cosmos is attacked by powdery mildew and a serious stem blight caused by *Phomopsis Stewartii*. Occasionally, cucumbers in the open are attacked by a powdery mildew. *Plasmopara pygmaea* is destructive to hepatica plants. According to Whetzel, this fungus perpetuates itself by a perennial mycelium as well as by oospores. *Ascochyta parasitica* and *Septoria parasitica* are sometimes associated with *Puccinia Malvacearum* on hollyhock leaves in such a way as to indicate that they are parasitic on the *Puccinia*.

Microsphaera Alni var. *Lonicerae*, said by Salmon not to occur in America, has been found in abundance at Geneva on leaves of Tartarian honeysuckle. The English hop mould or mildew, *Sphaerotheca Humuli*, occurred destructively at Waterville, Middleburgh and several other places in 1909. Some was found at Waterville, also in 1910. The comb-like raggedness of horse chestnut leaves, so common in New York, is caused by late spring frosts. Norway maple leaves show irregular holes due to the same cause. Sometimes large numbers of Norway maple leaves fall in June from the attack of aphids. *Rhytisma acerinum*, although common on *Acer rubrum* and *A. saccharinum*, does not attack *A. platanoides* in New York. *Septoria Cucurbitacearum* has been found on mush melon leaves near Syracuse. *Albugo candidus* has been found on a new host, *Tropaeolum majus*. Oak spangle galls, caused by *Cynips poculum*, strikingly resemble certain Discomycetous fungi. It seems very doubtful if the reddening of young oak leaves, as it occurs in New York, is of bacterial origin as claimed by Manna. A puzzling case of oedema on pear trees was observed in a nursery store-house at Rochester. In a Long Island orchard the leaves and fruit of Kieffer pears have been severely attacked by *Gymnosporangium globosum*. A pear grower of Kendaia has had much trouble from the failure of pear grafts caused by a canker which attacks the cut end of the stock. A new leaf disease of phlox caused by *Cercospora phlogina* has been found at Floral Park. In a nursery at Geneva, trees of Compass plum were severely injured by the conidial stage of *Sclerotinia fructigena*, which killed the twigs and produced cankers on the trunks of the trees. In all cases, the fungus entered through the blossoms. Adjacent trees of other varieties, not blooming, were uninjured. The *Corticium* stage of the potato *Rhizoctonia* has been found on Long Island. Except on Long Island, the Rhizoctonia occurring in Colorado and New York is the *Rhizoctonia violacea* which causes root-rot of alfalfa in Europe. Quince rust, *Gymnosporangium clavipes*, was unusually abundant in 1910. *Rhizoctonia* sp. causes damping off and rot of radishes in greenhouses. It has been proved, by means of artificial cultures, that *Leptosphaeria Coniothyrium* is the ascogenous form of *Coniothyrium Fuckelii.* Spores of *Leptosphaeria conothyrium* on pieces of dead raspberry canes lying on the ground may retain their vitality for four years. *Mycosphaerella rosigena* causes a leaf-spot disease of roses in greenhouses. *Sphaerotheca pannosa* produces perithecia on stems and leaves of roses in the open air, but not in greenhouses. In 1910, a rye field at Geneva was much harmed by a species of *Gloeosporium*, which attacked the leaves and berries of snowberry at Geneva. Two cases of powdery mildew on sweet peas were observed. Timothy heads showing proliferous flowers were abundant in Geneva in 1908. In the Station greenhouse tomato plants have shown leaves and shoots growing from flower clusters and leafy shoots growing from leaf-midribs. A new wilt disease of variegated Vinca, caused by *Phoma* sp., was observed at Batavia. Wheat has been attacked by *Tilletia foetens, T. Tritici* and *Septoria graminum.*

989 J. BEAUVERIE. **The Hypothesis of Mycoplasma and of Meta-Chromatic Corpuscles.** (L'Hypothèse du Mycoplasma et les Corpuscles Méta-Chromatiques). — *Comptes-Rendus de l'Académie des Sciences*, N. 10, pp. 612-615, Paris, 6 mars, 1911.

France Eriksson considers that the "rust" of cereals is transmitted by germs which existed in the seed of the host plant, and which he calls *mycoplasma.*

Recent researches have revealed to the writer the presence of "metachromatic corpuscles" in the cells of wheat attacked by "rust", which corpuscles have erroneously been regarded as the nuclei of Eriksson's hypothetical mycoplasma. These bodies are numerous in the cells of the hyphae, and also, though variable in form, in the cells of the host, at the level of the patches, but they never occur in normal tissues.

Eriksson also discovered in the cells "special corpuscles", a kind of mass of plasma, which Mr. Beauverie proves to be haustoria put out by mycelial filaments towards the interior of the cells (exogenous haustoria).

E. Gain. **Hibernation of Spores in Vine-Buds.** (Observations sur l'Hibernation des Spores dans les Bourgeons). — *C. R. Soc. de Biologie.* Tome LXX, N. 4, pp. 152-154. Paris, 3 février, 1911. **990**

France

Microscopic investigation of the buds of branches taken from a vineyard (Essai-le-Nancy) which had been especially attacked by parasitic diseases in 1910, revealed an unusually varied cryptogamic flora.

Besides several kinds of yeasts, which had found a home in the buds, a preparation from three buds of the same branch yielded 10 specifically distinct types of spores.

Among these some were divided into two, others into four parts, some were curved, and of Fusarian type, others rounded or ovoid, some were transparent, and others dark.

It therefore appears that the vine is a shelter both for the conidia found *in situ*, and also for free spores dating from the previous season, and destitute of any special means of resisting the inclemencies of the weather. It should be recalled that M. Ravaz has demonstrated that spores of *Oidium* occur in buds in a latent condition: Such spores as have a superficial position, are liable to be affected by cold in winter. Those which are found between the leaves of the bud, or even within its tissues, present an interesting biological problem. Their situation explains the infection of very young shoots sometimes seen, for instance, during epidemics of the vine *Oidium*.

The conidial form of spores which is considered merely as apparatus of distribution, is perhaps also a protective device, which is in this case helped by the bud, which offers an excellent shelter. Winter treatments can take the form of preventive measures, and should be devoted to the destruction of the refuges of the spores, the first cupric treatments of the spring ought to follow the opening of the buds.

The remains of the small bunches of grapes, still adhering to the branches, also showed different types of spores capable of germination.

It has been observed that buds from three different vineyards, one of which was on a more calcareous soil, did not exhibit the same adventitious flora; on the calcareous soil it was of a much less varied type.

M. Gain was curious to ascertain whether the buds of fruit-trees, and of the trees in hedges near the vineyards, also harboured parasites of the vine. He found various free spores in Dec, in or on the buds of pear and plumtrees in a vineyard in the neighbourhood of Nancy. Cherry and apricot trees in the same locality were free from spores.

991 **Insects as Agents of the Spread of Ergot in Gramineae.** See No. 1039 in this Bulletin.

992 P. FILTER. **On the Occurrence of *Tilletia horrida,* Takahashi in Rice Meal.** Ueber das Vorkommen von *Tilletia horrida*, Takahashi, in Reisfuttermehlen. — *Centralblatt für Bact., Par. und Infektions-krankheiten.* 29 Band, N. 12-14, pp. 342-346, 4 Abb. Jena, 2 März 1911.

Japan. United States. India.

Microscopical investigations have long since revealed the presence of the large black spine-covered spores of an Ustilago in commercial rice flour.

The fungus has been recognized as *Tilletia horrida*, Takahashi, described for the first time in 1906 as a parasite on rice in Japan, and mentioned in 1899 as harmful to that plant in the United States where it is known under the name of *T. corona*, Scrib.

It is also widely spread in the rice-plantations of North India.

993 L. HILTNER and G. IHSSEN. **Harm Caused to Cereals by *Fusarium*** (Ueber das schlechte Auflaufen und die Auswinterung des Getreides infolge Befalls des Saatgutes durch *Fusarium*). — *Landw. Jahrbuch für Bayern.* 1. Jahrgang, N. 1, pp. 20-60, N. 4, pp. 315-362.

The results of recent experiments on the imperfect development and feeble resistance to cold, which characterize cereals attacked by *Fusarium*.

1) The grain of all cereals is exposed to the attacks of *Fusarium.*

Winter and summer varieties are both harmed, for though the latter are not exposed to frosts, they cannot make up for imperfect development by a larger growth of stalks, as the winter varieties are able to do.

2) It appears that local varieties (*Landsorten*) when cultivated within their special area, are less liable to *Fusarium* infection than imported varieties. The disease causes a considerable reduction in the crop.

All imported varieties should be subjected to strict tests (with a view to ascertaining their resistance to cold) before any estimation of their worth can be arrived at.

3) Failures in the cultivation of cereals have often arisen from the presence of *Fusarium* in the seed, which should therefore always be subjected to treatment before sowing.

4) All growers and other sellers of seed should, in future, be compelled to furnish a certificate of the good quality of the seed; a latitude of about 3 % is however allowed.

5) Even controlled seeds must also be investigated and tested for the presence of the fungus.

6) Treatment with a 1 % solution of sublimate has proved the most practical and efficacious remedy.

But though it appears that no toxic property is conveyed to the grain, still it is recommended to use seed so treated for purposes of sowing only.

7) Formalin added to the sublimate makes an effectual prophylactic mixture against *Rust* as well as *Fusarium.*

8) The solution of sublimate promotes the germination of rye and accelerates the growth of the young plants.

9) The attack of *Fusarium* seems largely to depend upon the meteorological conditions existing at the time of the ripening of the grain. The longer this period is extended, the greater the exposure to infection. If once the fungus establishes itself in a locality, it may soon, under favourable conditions, form a centre of infection whence it spreads to all cultivated cereals.

10) The species of *Fusarium* which attacks cultivated cereals is the conidial form of *Nectria graminicola,* Berk and Br.; it appears in spring upon the winter wheat under the form of *Fusarium nivale.*

994 M. KASAI. **On the Japanese Species of Phragmidium.** (Trans. of the Sapporo Natural History Soc. Vol. III, pp. 27-51, tab. I. 1910). — *Annales mycologici* Vol. IX, N. 2, pp. 194-195. Berlin, März 1911.

Japan

This is the third part of the *Contributions to the Mycological Flora of Japan,* and contains an account of 17 species of *Phragmidium* which occur in that country, of which one grows on *Potentilla,* 6 on *Rosa,* 9 on *Rubus,* and one on *Sanguisorba.*

Amongst these, the three following are new species;

Phragmidium Rosae rugosae and *Phr. yezoense,* which grow on *Rosa rugosa,* and *Phr. Rubi japonici. Phr. americanum,* (Pk) Diet.. which grows upon *Rosa dahurica, Phr. fusiforme,* Schröt., on *Rosa acicularis, Phr. Rubi* (Pers.) Wint. on *Rubus arcticus, Phr. Rubi Idaei* (Pers.) Wint. on *Rubus Idaeus,* var. *strigosus,* are new to the flora of Japan.

995 C. W. EDGERTON. **The Bean Anthracnose.** — *Bull. Agric. Exper. Station of the Louisiana State Univ.* N. 119, 55 pp., 14 tables, 1910. (*Annales mycologici,* Vol. IX, N. 2, p. 201, Berlin, März 1911).

U. States: Louisiana

The description of this disease is given, with accounts of infection experiments with *Gloeosporium Lindemuthianum* (Sacc. and P. Magnus) which is the cause of the malady.

The incubation period of the fungus is from 4 ½ to 6 days, high temperatures hinder its development, therefore the disease spreads little during the hot summer months.

Gloeosporium does most harm when it attacks beans, and its spores germinate either on their surfaces, or between the cotyledons.

996 F. AUMIOT. **Some Disease-Resistant Varieties of Potato.** (Quelques variétés de pommes de terre résistantes à la maladie). — *Progrès agricole et viticole.* N. 6, pp. 183-187. Montpellier, 7 février, 1911.

France

During 1910 the potato-crops were much attacked by *Phytophthora infestans.*

The "rot" of the tuber, or "moist gangrene", was also wide spread; this disease is caused frequently by micrococci associated with *Bacillus subtilis*, but it can equally well be due to *Phytophthora*, and in damp seasons, the action of these agents is simultaneous.

It has been ascertained during the year which varieties, after two cupric treatments, yield a normal crop, even under very unfavourable circumstances. These varieties are:

" Sénateur Edouard " " Millaud de Loisy, " " Goes ", " Causse ", " Eiffel ", " Président Krüger ", " Géante Bleue ", " Wonder of the World " " Dr Lucius ", " Institut de Beauvais ", " Professeur Olmichen ", " Fidelios ", " Geante Blanche ", " Fin de siècle ", " Magnum bonum bleu ", " Lucien Tisserand ", " Pousse-Debout ", " Belle de Juillet ", " Solanum Commersoni violet 1-01. "

The necessity of cupric treatments is insisted upon, especially in wet seasons.

997

O. APPEL. **The Selection of Seed Potatoes.** (Kartoffelernte und Saatgut). — *Illust. Landw. Zeitung.* 31 Jahrg. N. 15, pp. 134-136 mit Abbild. Berlin, 22 Februar 1911.

Germany: Prussia

Observations made in 1910, have shown that, in order to prevent the potato crop being damaged by diseases, the following rules should be carried out in the selection of seed potatoes.

1) These tubers should be carefully separated from any which are diseased.

2) They should be kept in a dry place for some days before planting.

3) Any varieties which were much attacked by Leaf-Curl in the previous season should be rejected.

4) No small tubers should be used.

998

ET. FOEX. ***Cicinnobolus*, an Inefficient Natural Foe of the *Oidium* of the Oak.** (Un Champignon Ennemi Naturel de l'Oïdium du Chêne). — *Le Progrès agricole et viticole*, 28^e^ année, N. II, pp. 342-343, Montpellier, 12 mars, 1911.

France

Mr. Vuillemin believes that a *Cicinnobolus* which he found upon the *Oidium* of the oak is capable of hindering the development of this dangerous parasite (1).

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(1) See this Bulletin of Nov. 1910 p. 167. [*Ed.*].

Mr. Foex however, does not share the above conviction. A plant of *Lycium barbarum* which he has observed for 6 years, continually bears, winter and summer alike, an *Oidium* which is nearly always infested with a *Cicinnobolus* (1).

The leaves of the pumpkin, like those of most Cucurbitaceae, moreover, are often invaded by an *Oidium*, which is usually in its turn, attacked by a *Cicinnobolus*.

Similar facts occur in the case of white *Oïdium* of peas and many other *Oïdia*.

The latter are little troubled by the incessant attacks of the *Cicinnobolus*, probably because their development is stronger than that of their enemy.

999 E. DURIER. **Accidental Variations in the Composition of Cupric Mixtures.** (Variations accidentelles de la composition des Bouillies cupriques). — *Annales des Falsifications*. An. IV, No. 29 pp. 133-138. Paris-Genève. Mars 1911.

France Although the powders destined for the preparation of cupric mixtures are finely ground, they consist of particles of a certain size.

This want of homogeneity results in the heavy parts of the mixture sinking to the bottom of the sack, and the lighter portions coming to the top, during operations at the factory, and transit by rail.

Experiment has proved that the amount of copper may be 0.7 % more or less than the average, according to whether the sample is taken from the upper or lower portion of a sack which has been shaken about during transport, so that the constituent parts of its contents have arranged themselves in order of density. Further, the same sample is never homogeneous, and the variation shown by different analyses may amount to 0.2 %.

Analysis may give therefore a result which represents the copper content as 0.9 %, or the $SO_4Cu + 5 H_2O$ as 3.6 % more or less than it really is.

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(1) *Lycium barbarum*, L. is a shrub belonging to the Solanaceae; it grows in Europe and Asia, and is cultivated for hedges.

In Japan, a tea is made from an infusion of its leaves and, according to Thunberg, its fruits are used in medicine. The young shoots are eaten as asparagus in Provence, and its leaves as salad. Cf. DUJARDIN-BEAUMETZ et EGASSE, *Les plantes médicinales indigènes et exotiques*, p. 426, Paris 1889. [*Ed.*]

This shows what precautions are necessary in order to obtain samples which do not vary more than 0.2 %.

A process is described which allows of the obtaining of a sample as homogeneous as possible and the method is given for ascertaining the amount of copper by means of electrolysis.

L. L. VAN SLYKE, A. W. BOSWORTH and C. C. HEDGES. **Chemical Investigation of the Best Conditions for Making Lime Sulphur Wash.** — *New York Agricultural Experiment Station Bulletin* N. 329; Geneva, N. Y. Dec. 1910, pp. 405-449. **1000**

U. States: N. York

The conditions are studied for the more effectual preparation of the lime-sulphur mixture as fungicide and insecticide, the aim being to obtain a mixture with the maximum proportion of calcium pentasulphide (CaS_5).

As a result of the researches carried out, the following proportions are recommended: 36 pounds of lime (based on pure lime, Ca O), 80 pounds of high-grade, finely-divided sulphur, and 50 gallons of water. When lime containing 95 %, or less than 95 %, of calcium oxide is used, more than 36 pounds must be taken, according to amount of impurities (38 pounds for 95 % of lime and 40 pounds for 90 %), but no lime should be used containing less than 90 % of calcium oxide, or more than 5 % of magnesium oxide.

E. S. SALMON. **Spraying Experiments with a Lime-Sulphur Summer Wash.** — *The Journal of the Board of Agriculture*, N. 11, p. 882-891. London, February, 1911. **1001**

Great Britain: Kent.

During the past summer further spraying experiments with a lime-sulphur wash were carried out on the foliage of apples and gooseberries in the plantations of the South Eastern Agricultural College, Wye, and on two farms in Kent.

In the experiments no opportunity occurred for testing the value of lime-sulphur as a fungicide against apple scab or black spot. As, however, it has been stated, as the result of experiments carried out in the United-States, that it « is about as effective » for this purpose as Bordeaux mixture, the lime-sulphur wash may be recommended for trial in England on those varieties of apples whose foliage or fruit will not stand spraying with Bordeaux mixture. The experiments showed that while the foliage of some varieties, *e. g.* Worcester Pearmain, showed no injury when sprayed with a lime-sulphur wash of sp. gr. 1.01, the foliage of other varieties, *e. g.* Cox's Orange Pippin, Charles Ross, King of the Pippins, Blenheim Orange, and Besspool are severely *scorched* by the wash at this strength. For such varieties a lime-sulphur wash of sp, gr. 1.005 should be used when spraying them in June or later, though possibly the *full-strength* wash is safe to use in May. It must not be forgotten, however, that in fighting apple scab or black spot, Bordeaux mixture still remains the best fungicide known, and should always be used for this purpose *except on those varieties of apples which are liable to Bordeaux injury.*

The lime-sulphur wash, as well as the iron sulphide and copper-sulphide washes should only be used at present experimentally and on a small scale.

The experiments give some evidence that the *home-boiled* lime-sulphur wash is efficacious against *powdery-mildews.* Although the wash has been used *at full strength* (sp. gr. 1.01) in May on the foliage of apples and gooseberries without causing any injury, it is advisable at present to use the wash at *half-strength* (sp. gr. 1.005). Later in the season a weaker wash is necessary when used on certain varieties of gooseberries: a point which requires further investigation.

1002 B. H. ALFRED GROTH. **Contributions to the Study of Bordeaux Injury on Peaches.** — *New Jersey Agricultural Experiment Station.* Bull. N. 232, pp. 3-19, September 8, 1910.

U States Bordeaux injury on peach leaves may occur after a very light spray, an ordinary spray or a very heavy spray. In the laboratory it may occur under the following conditions combined: A covering of water on the leaves; a high humidity of the atmosphere; an excess of respiration over carbon dioxide assimilation; shade.

The result of Mr. Groth's experiments may suggest the following explanation in which the copper appears as the evident harmful agent. An excess of carbon dioxide evolved in the shade, passes into the water standing on the leaf during wet weather. Carbon dioxide is dissolved, and the carbonated water thus formed dissolves some of the copper. The copper solution diffuses through the water film into the stomatic chamber and kills the cells with which it comes in contact.

F. W. FOREMAN. **The Fungicidal Properties of Liver of Sulphur.** — *The Journal of Agricultural Science.* Vol. III, Part 4, pp. 400-416, Cambridge, December 1910. **1008**

Great Britain

The term « Liver of Sulphur » does not represent a standard product. Samples from different sources show variation in solubility, alkalinity and content of potash, sodium carbonate being sometimes used in its manufacture instead of the potassium compound. Liver of sulphur contains various oxidation products in addition to sulpho-hydrate, sulphide and polysulphides of either potassium or sodium, and free sulphur is present in the majority of cases. The oxidation products present possess little or no fungicidal properties when tried separately in weak solutions upon the spores of *Botrytis cinerea.* Saturated sulphuretted hydrogen solution and free sulphur have absolutely no adverse effect upon the germination of spores of this fungus.

The 0.16 per cent solutions of soda were not quite strong enough to prevent germination, but 0.25 per cent solutions were effective for this purpose. The spores of *Botrytis* were killed after an exposure of 1 to 2 hours to 0.5, and 2 to 3 hours to 0.25 and 0.33 per cent soda. The 0.5 per cent solutions of potash required 3 to 4 hours and 0.33 per cent 4 to 5 ½ hours. The 0.33 per cent solutions of polysulphides required somewhere between 6 and 27 hours' exposure. These results point to the conclusion that the free alkali soda is the most potent fungicidal agent in the whole mixture, potassium hydroxide being also poisonous, but to a smaller extent. The use of soda instead of potash increases therefore the value of liver of sulphur as a fungicide and this should bring about a considerable reduction in price. The presence of air throughout the experiments assisted the germination of the spores. Roughly speaking, the effect of the solutions upon the spores of American Gooseberry Mildew was similar in general trend to the effect upon spores of *Botrytis.*

Throughout the laboratory experiments the importance of thoroughly wetting the spores with the solutions is emphasized and it is doubtful whether one spraying is ever sufficient to do this and to check a disease.

1004 D. VIGIANI. **Paring and Burning the Soil as a Remedy against the "Root-rot„ of Tobacco Plants.** (I Semenzai di Tabacco) — *Rivista di Agricoltura e Zootecnia.* Anno III, N. 2, pp. 23-25. Barullo (Arezzo) Febbraio. 1911.

Italy: Tuscany

The most serious disease which occurs in tobacco nurseries is a decay of the root due to the presence of the parasite *Thielavia basicola.*

Sterilization of the vegetable soil by means of fire, has yielded fairly good results in checking the malady, and Prof. Vigiani considers it a more practical method than treatment with formalin and water vapour under pressure, which Dr. Gilbert has practised in America.

Dr. Fuccella obtained excellent results by replacing the burnt soil by river, sea, or quarry sand fertilised with chemical manures. He recommends making a layer of sand a little more than 12 centimetres thick. The sand should have a coarseness of 0.5 mm. and should be fertilised with 3 kg. of mineral superphosphate, 2 kg. potassium sulphate, 3 kg. dried blood, and 1 kg. plaster of Paris per cubic metre.

Dr. Benincasa made several experiments in transplanting tobacco plants from the nursery into soil sterilised by heat, and composed of sand or pozzolana and fertilised with different substances. The results proved the correctness of the theory that the decay of the root of the tobacco-plant is caused by the action of a parasite, *Thielavia basicola,* Zopf, and showed also that the most common and fruitful source of infection is the soil which is usually employed in making the nurseries.

Further, it was discovered that the disease was found even in beds made with burnt soil, which proves, either that sterilisation by means of heat is not sufficient, or that the soil became infected subsequently.

In any case, it is well to observe, that in order to protect tobacco-nurseries from the attack of *Thielavia* by means of paring and burning the soil, it is necessary to water previously, and to keep up a temperature of 100° C for three or four hours at least; further, the soil must be stirred during this time, in order that the heat may act thoroughly.

Nurseries made with pure sand are better protected against the attack of the parasite than those in which soil-burning has been practised. Pozzolana has proved an excellent soil for young tobacco-plants in every way; and is perhaps even more efficacious than river-sand in hindering the development of *Thielavia*.

It is also possible that other substances, such as slag from smelting-furnaces, and the residues of coal combustion, as well as triturated volcanic rocks might prove as satisfactory as pozzolana, or volcanic ash.

Parasitic Diseases of various Plants and Means of Prevention and Cure.

1005

J. H. PRIESTLEY and A. E. LECHMERE. **A Bacterial Disease of Swedes.** — *The Journal of Agricultural Science*. Vol. III, Part 4, pp. 390-397. Cambridge, December 1910.

Great Britain

A disease of swedes is described and attributed to the action of an organism, probably *Bacillus Oleraceae*, Harrison, but closely allied to *Pseudomonas destructans*, Potter. It is suggested, after consideration of its appearence on various culture media, that these two organisms may be different growths of the same parasitic species.

1006

K. MICZYNSKI. **The Effect of Smut on the Shape of Wheat Ears.** (Der Einfluss des Steinbrandes auf die Form der Weizenähren). — *Zeitschrift für das Landw. Versuchsw. in Oesterreich*. XIV Jahrg. Heft 3, pp. 232-234. 1 Abbild. Wien: März, 1911.

Austria

A short paper dealing with the effect of " Smut " (*Tilletia Tritici*, Wtr.) on wheat ears.

Three wheat varieties: *Triticum compactum* var. *hystrix*, Kcke.; *Tr. comp.* var. *erinaceum*, Desvaux; and *Tr. comp.* var. *echinoides*, Kcke, which had been sown on the experiment field, suffered severely from the fungus, and the ears showed great divergence from the healthy individuals; the latter being normally compact, the former longer and much less thick.

1007 A. Jacevski. **A New Potato Disease: Canker of the Tubers.** (Novaia Boliesn Kartofelia. Rak Klubnei). — *Selskoie Khosiaistvo i Liesovodstvo* (*Journal of Agriculture and Forestry*). CCXXXV Tom., G. LXXI, pp. 38-51. St. Peterburg, Jan. 1911.

This disease is called in Russia " Rak Klubnei ", in Germany " Kartoffelkrebs ", and in England " Wart Disease ", " Cauliflower Disease ", " Black Scab ", and " Potato Canker ".

Russia It attacks the tubers and the underground part of the plant in general, though it is difficult to diagnose it before the potatoes are dug up, as the stems and leaves look very green and flourishing, because of the stimulating action of the parasite fungus on the tissues.

Simultaneously with the shoots there appear on the tubers excrescences, at first of a yellowish white colour, which passes to brown and then to black. They spread and run into each other forming a blackish warty mass which covers the infected tuber either completely or in part, and is an excellent substratum for the development of fungi and bacteria.

Similar formations are sometimes seen on the stolons. They are then above ground and are green-coloured. And since the chlorophyll tissues are immune, it seems that the infection takes place under ground, and that the altered parts only come to the surface later, through the growth of the stolons themselves.

In many parts of Germany it is believed that potatoes affected by this disease are poisonous. While this is an exaggeration, it is certain that they may cause digestive troubles, as is proved by experiments made on rabbits.

The disease is due to an Oomycete, to *Synchytrium endobioticum*. The zoospores which develop in the spring are 22.5 μ in diameter; they soon pass into the amoeboid form, when they penetrate into the plant tissues. From these one or more sporangia develop, each with a number of little spores, which rapidly propagate the fungus during the vegetative period. At the end of the autumn, there appear the dormant spores or winter sporangia, which are like the oospores of the Peronosporeae; they have such strongly cutinised walls that they can resist a temperature as low as —13° C or 8°.6 Fahr.

From these sporangia, under favourable conditions, there spring zoospores, which are identical with the summer ones, propagating themselves and developing in the usual way.

The following are among the remedies recommended:

1) Treatment of the seed tubercles by flower of sulphurs.

2) Sterilisation of the potatoes used for fodder, in order to prevent the spores being diffused by dung.

3) Careful disinfection, before use, of the implements for working the infected soil.

4) The introduction of early varieties which reach maturity before the disease is far advanced (1).

GRIFFON AND MAUBLANC. **A new Chytridinea Parasite of Rye grass.** — *Bulletin de la Soc. Mycol. de France.* Tome XXVI, 3e livr., 5 pp., pl. XV. Paris, 1910.

1008

On a recently sown Rye grass meadow some yellow spots appeared and spread rapidly. The young Rye grass plants about 3 or 4 inches high were attacked about the crown; the sheaths and underlying tissues turned brown, after which the roots rotted, causing the death of the plants.

France

Microscopical investigation showed the cause of this rot to be a *Chytridinea* which the writers consider new and which they name *Cladochytrium* (*Physoderma*) *caespitis*, n. sp.

Phoma Betae. — " Beet-Rot ", *Rhizoctonia violacea.* Hernia of the Roots. *Peronospora Schachtii, Cercospora beticola, Clasterosporium putrefaciens*; diseases of sugar-beet. See Number 1055 in this Bulletin.

1009

C. W. EDGERTON. **Some Sugar-Cane Diseases.** — *Bull. Agr. Exper. Station of the Louisiana State Univ.* N. 120, pp. 28, 12 fig. 1910. (*Annales mycologici,* Vol. IX, N. 2, p. 202. Berlin. März, 1911).

1010

A description of the following fungi which are parasitic on the sugar-cane: *Colletotrichum falcatum, Melanomma Sacchari, Thielaviopsis ethacetica* and *Marasmius plicatus.*

U. States: Louisiana

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(1) On Potato Wart Disease, see the following abstracts published by the Intelligence Office of the Intern. Inst. of Agric.: *The Science and Practice of Farming during* 1910 *in Great Britain.* pp. 352. 353, 354.
Also, Bull. Dec. 1910. p. 361. [*Ed.*].

C. falcatum occurs the most frequently, and generally makes its entrance through the wounds caused by insects. The affected tissue assumes a brilliant red colour, especially in the neighbourhood of the nodes, and when the disease is further advanced the leaves wither.

In the case of attack by *Marasmius Sacchari*, the leaves wither very rapidly, and the stalk is discoloured.

Thielaviopsis ethacetica spreads very quickly in the plantations, as the mycelium soon infests the plants which it attacks, and its fructifications are very numerous. The plants affected give out an odour resembling that of pine-apples.

While the above-mentioned parasites only destroy the aerial portions of the sugar-cane, *Marasmius plicatus* kills the roots.

1011 **The "Red Rot„ of the Sugar-Cane.** (La putrefacción roja de la Caña de Azúcar). — *La Hacienda*, Vol. VI, N. VI, pp. 177-178, Buffalo N. Y. Marzo, 1911.

U. States. Java. India etc.

The sugar-cane in tropical countries, such as Louisiana, Florida, Georgia, etc., is reported to be much attacked by a disease caused by *Colletotrichum falcatum*, and known locally as the *Red Rot of lhe Sugar Canc.*

The parasite does harm in two ways:

1) The sugar-content, (especially the saccharose) of the cane is diminished. Analyses made in Java, Bengal and Hawaii show that the amount of saccharose may be reduced by $^2/_3$ or $^3/_4$.

2) The buds of the seed-canes are destroyed, and the development of new plantations is thus hindered. Plants which have attained to a more advanced stage of development resist the disease, which can also be combated by the use of antiseptics and the excision of the affected parts.

1012 F. J. F. Shaw. **The Copper Blight of Tea.** *The Agricultural Journal of India*. Vol. VI, P. I, pp. 78-79. Calcutta, Jan. 1911.

British India: Bengal.

This disease was found recently on dried leaves from the Doars and is probably identical with a blight previously observed in Assam. The first symptom is the appearance of a small copper-coloured spot on the upper surface of the leaf, having an irregular shape and the margin not well defined. The surface of the discoloured patch is covered with very minute black spots, which the microscope shows to be due to the disintegration of the peripheral leaf tissue. Later on, the discolouration extends right through the leaf, appearing as a yellowish brown patch on the under surface, and taking on a grayish colour on the upper. The diseased portion of the leaf is now very brittle, and is often traversed by numerous cracks.

Detailed examination has led to the presumption, which is as strong as it can be, in the absence of adequate cultural experiments, that the disease here called "Copper blight" is due to the fungus *Laestadia Theae*, Racib., at first in the pycnidial and later in the ascigerous stage.

As spraying with Bordeaux mixture has been used with success in treating Black Rot of grapes, a disease due to another species of *Laestadia*, it might probably be beneficial here.

CH. BERNARD. **A Disease of Young Tea Plants in Java.** (Over eene Ziekte der Jonge Theeplanten). *Departemant van Landbouw. Mededeelingen van het Proefstation voor thee.* No. IX. Buitenzorg, 1910. **1013**

Java

Description of a new disease of young tea plants, which develops in the Java plantations, when the temperature and dampness of the soil are very great. Sometimes the roots, sometimes the stems are attacked. In the former case the root tissues take on a brownish colour, the pith cells are filled with colourless ramified hyphae, and the plant soon dies. In the latter case, the young leaves wither and fall, while that part of the stem which is immediately above the soil shrivels and changes colour in part of its length.

Under the microscope the same colourless hyphae are found, while in the cells most attacked the starch disappears, probably through the action of the zymases produced by the mycelium of the fungus.

The total absence of reproductive organs (conidia or spores) has up to now prevented this fungus from being determined.

Remedies suggested:

1) Storage of the seed in appropriate places, kept carefully clean.

2) Shade and suitable drainage.

3) Watering the nursery beds with lime water.

1014 - **Increase in the Cultivation of the Cacao Tree at Surinam owing to Measures against Disease.** (Relèvement de la culture du Cacaoyer à Suriman par le traitement de la Maladie). — *Journal d'Agriculture Tropicale,* IIe année, N. 116, p. 61, Paris, février 1911.

Surinam

According to the report of the British Commission which recently visited Surinam, the export of cacao, which amounted to 4500 t. in 1895, and fell in 1904 to 850 t., rose in 1909 to 1897 tons.

This improvement is owing to the energetic measures taken against the disease called "Witches' Broom" (1).

The remedies consist in pruning the trees severely during the dry season, and spraying them with a mixture containing 3 % copper sulphate. The crop of the year is lost, but those of the following years are largely increased.

1015 Griffon and Maublanc. **On a New Rust of Green-house Orchideae.** (Sur une nouvelle « Rouille » des Orchidées de serre). *Extrait du Bulletin de la Société Mycologique de France.* Tome XXV. 3e Fasc. Paris.

France

Several species of *Oncidium* of Brazil (*O. Marshallianum,* Reich. f., *O. crispum,* Lodd., *O. varicosum.* Lindl. var, *Rodgersii,* Hort.) coming from greenhouses in the neighbourhood of Paris have been attacked by a « rust » producing on their leaves widespread yellowish spots.

The cause of the disease is a fungus, and all its characters, its mode of development, and especially the fact that its spores issue in clusters from the stomata, show that it belongs to the genus *Hemileia.* It is named by the discoverers: *Hemileia Oncidii,* Griff. et Maubl. nov. sp.

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(1) See in No. 95 of the *Journal d'Agriculture tropicale,* p. 159, Paris, May 31st 1909, the abstract made by Mr. Patouillard from the work of Messrs C. J. J. van Hall and A. W. Drost. *Les Balais de Sorcière du Cacaoyer provoquées par Colletotrichum luxificum,* n. sp. (Recueil de travaux botaniques néerlandais, Vol. IV., 30 p.p., 17 pl. 1907). According to these writers the "Witches' Broom" of the Cacao-tree, hitherto attributed to *Exoascus Theobromae,* Ritzema Bos, results from deformations produced by *Colletotrichum luxificum,* n. sp. (*Ed.*).

Experts do not consider the trouble a serious one. It is easily checked by washing the lower surface of the leaves with a mixture of water, tobacco juice, and soft soap. After this treatment the spot turns brown, but the reproductive process of the fungus is stopped.

1016

GRIFFON and MAUBLANC. **On Some Fungus Parasites of Green-house Plants.** (Sur quelques champignons parasites des plantes de serre). — *Extrait du Bulletin de la Société Mycologique de France.* Tome XXV, 4e Fasc. Paris, 1910.

France

Description of two new species of fungus parasites found by Messrs Griffon and Maublanc on green-house plants: *Pestalozzia Clusiae,* on the leaves of *Clusia* sp., and *Phyllosticta Dracaenae,* on the leaves of *Dracaena* sp.

The extract concludes with notes on *Gloesporium Sorauerianum,* Allescher, parasite of the *Codiaeum,* Euphorbiaceae which are much cultivated in green-houses for their leaves.

1017

G. MASSEE. **A Disease of the Lilac,** *Holminthosporium syringae Klebahn. — Kew Bulletin of Miscellaneous Information,* N. 2, pp. 81-82, London, 1911.

Great Britain

Lilac bushes are the latest victims to an epidemic caused by the fungus *Helminthosporium Syringae,* Klebahn. The leaves are the part attacked, and show the earliest indication of injury in a brownish stain running down each half of the leaf, at some distance from the midrib; this stain gradually spreads, but appears never to extend to the edge of the leaf; the stained area becomes darker in colour, and studded with olive-black patches of the fruit of the fungus. At a later stage the diseased portion of the leaf becomes brown and dry and frequently more or less cracked or torn. Spores are produced in great abundance on diseased leaves, and these are washed by rain or carried by insects, birds, etc., to other parts of the bush, resulting in the infection of practically every leaf, which prevents the ripening of the wood, and generally tends to weaken the plant.

Foliage sprayed with a solution of potassium sulphide (liver of sulphur), half an ounce in a gallon of water, was found to resist infection, and this treatment, begun at an early stage, would probably hold the disease in check. Diseased fallen leaves should be collected, and either buried or burned.

1018 D'ARBOIS de JUBAINVILLE. **Vine Mildew.** Au sujet du "Mildiou". — *Bulletin des Séances de la Société nat. d'Agr. de France.* N. 1, pp. 41-43. Paris, janvier, 1911.

France Torrential rains accompanied by a temperature of about 20° C., which is very favourable to the development of *Plasmopara viticola*, the vine-mildew, were very frequent in Lorraine during 1910. The writer possesses at Nancy and at Eulmont, trellises arranged according to the system employed at Thomery. At both these places, treatments with cupric mixture were carried out, but at Nancy the dead leaves of the vines containing countless oospores of *Plasmopara* had been removed at the beginning of winter, thus avoiding an outbreak of " mildew " in the ensuing spring. The result was, that while the vines at Eulmont lost their leaves early in the season, those at Nancy were completely untouched throughout the year. The fallen leaves of the vine should therefore be removed in the autumn. But this costly labour can only be remunerative where grapes fetch a high price.

In order that the removal of the dead leaves be of use, it must be general throughout the district; and they must be dug into the ground for several years to insure the death of the oospores of the parasite.

These measures could be insisted upon by the Department Prefects, seeing that they are mentioned in the French law of June 22nd 1868.

1019 **Shot-Hole Fungus,** (*Cercospora circumscissa*, Sacc). — *Board of Agriculture and Fisheries. Leaflet.* N. 247, pp. 1-4. London, Jan. 1911.

Great Britain The parasite *Cercospora circumscissa* attacks the leaves of the peach, almond, cherry, apricot, and nectarine. Less frequently, the leaves of the plum and other rosaceous trees are injured. The first indication of the disease is the presence of small pale-green, translucent spots on the blade of the leaf. When the patches commence to turn yellow, the fungus bursts through the epidermis of both sides of the leaf, in the form of very minute dark-coloured hair-like tufts, or threads, which bear minute spores at the top. The irritation caused by the fungus induces the formation of a circumscribing wall of wound-cork round the affected area, which dries, contracts, and falls out, together with the fungus, which remains in the fragments till spring, when a crop of spores is produced, and infection of the young leaves takes place.

When the disease attacks a tree, almost every leaf becomes infected, and often the tree is completely defoliated early in the season. In such cases, the formation of wood is checked, and there is lack of reserve food.

The best remedy is a fungicide known as " self-boiled lime-sulphur mixture ", the proportions for a mixture ready for use are, 8 lbs lime, 8 lbs. sulphur, 50 gallons of water.

1020

C. SPEGAZZINI. **The *Coryneum Beijerinkii*, Harmful to Fruit Trees in Argentina.** (Enfermedades de los frutales. La viruela holandesa). [*Gaceta Rural*, año IV, No. 43, pp. 521-523, 2 figg. Buenos Ayres, Febrero, 1911.

Argentine

There has been an enormous increase this year in Argentina of the fruit tree disease which is caused by the *Coryneum Beijerinckii*. Mr. Spegazzini call sit the «viruela holandesa» (Dutch pox), because the fungus in question was discovered in Holland by Ondemans.

The infection which is new to the country is sufficiently serious.

Mr. Spegazzini gives a description of the parasite, together with the probable remedies.

1021

E. S. SALMON. **Apple Scab or " Black Spot ".** (Conidial Stage, *Fusicladium dendriticum* Fckl. Ascigerons Stage, *Venturia Pomi* (Fr.) Wint.). — Department of Economic Mycology. South-Eastern Agricultural College, Wye.

Great Britain: Kent Surrey

Heavy losses are being sustained in Kent and Surrey through the ravages of the " Black Spot ". The disease has increased of late, and certain varieties of apples hitherto immune have now been attacked.

It is caused by an Ascomycete, which has two stages as described above. This fungus attacks the leaves in different ways, sometimes causing blister-like spots on the upper surface; and in all cases the part affected takes on a dark olive-green or sooty colour.

These patches are full of minute spores which quickly spread from leaf to leaf, and from tree to tree; on reaching the fruit immediately infect it, thereby arresting its growth on deforming it.

The fungus may also reach the fruit through the young wood. The latter, when attacked, presents a blistered appearance, due to numerous blackish pustules of spores, which break out through the bark where the mycelium has pushed its way. These spores are capable of germinating immediately, and during the spring and early summer are blown from the diseased wood on to the leaves and young fruit, thus producing in the latter the " Black Spot " disease.

Remedies:

1) Spraying three times with Bordeaux mixture (8 lbs copper sulphate, 8 lbs quicklime, 100 gals. water): first application, on the unfolding leaves just before the blossoms open; second application, just after the petals fall; the third, two or three weeks later.

2) When the young wood has become diseased, a strong *winter* wash of copper sulphate or " blue stone " (4 lbs copper sulphate, 100 gals. water should be applied *when the tree is dormant.*

3) The following nine varieties appear so far to be resistant to the disease: Beauty of Bath, Bramley's Seedling, Newton Wonder, Grenadier, Lord Derby, Lane's Prince Albert, Queen, the Victorian, Golden Spire.

1022 HARVEY JOHNSTON. **Fungoid Diseases on Apple Trees, in New South Wales in 1909.** — *Report of the Government Bureau of Microbiology for* 1909. Sidney, 1910, p. 55.

Australia: New South Wales. United States. Germany.

The diseases found were: " Leaf spot " due to *Phyllosticta prunicola:* " Scab " or ' Black spot " which is produced on the leaves and fruit by *Fusicladium Dendriticum.* " Bitter pit „ was studied but no causative organism could be found. The same result has been experienced in Germany and in the United States. Several specimens showing " Ripe rot " or " Bitter rot „ were diagnosed as being produced by a fungus: *Gloeosporium fructigenum* ." Mouldy core " was identified on culturing *Penicillium glaucum.* The " honey fungus " *Armillaria mellea*, was recognised as the cause of a root rot.

G. KÖCK. **"Apple Scab" (*Venturia inaequalis*) "Pear Scab" (*V. pirina*), *Monilia* and *Sphaerella sentina* on Different Varieties of Pear and Apple Trees, Observations made in Austria in 1910.** "Schorf", *Monilia* und Weissfleckigkeit auf verschiedenen Obstsorten. Beobachtungen im Jahre 1910. — *Zeitschrift für das landwirtschaftliche Versuchswesen in Oesterreich.* XIV Jahrg. Heft 3, pp. 209-213. Wien, März, 1911. **1023**

Austria

On account of the abnormal atmospheric conditions which prevailed during the vegetation period of 1910, and were characterised by an unusually heavy rainfall, cultivated plants were much attacked by cryptogamic diseases. In the nurseries at Eisgrub, the Phytopathological Station of Vienna, the pear and apple-trees suffered to an extraordinary degree from "Schorf" (1), from *Monilia*, and (the pear trees especially) from *Sphaerella sentina*. It was interesting to note the manner in which the different varieties of pear and apple-trees resisted the inroads of the parasites. Some were uninjured, others suffered more or less severely, while a few were seriously damaged.

The writer gives a list of the different varieties which he has examined and classified according to their powers of resistance.

His observations, though useful, can only have a local value.

E. VOGES. **Control of the *Fusicladia* of Apple and Pear-Trees.** (Die Bekämpfung des *Fusicladium.* Zeitschrift für Pflanzenkrankheiten. Bd. XX. Heft 7, pp. 354-393. Stuttgart 1910). — *Botanisches Centralblatt,* Bd. 116. N. 10, pp. 261-262. Jena. 7 März, 1911. **1024**

Germany

The writer is of opinion that, considering the mode of life of the *Fusicladia* which attack apple and pear-trees, some of the measures suggested by W. F. Fischer for the control of these fungi are not very advisable. He believes that spraying the trees with Bordeaux mixture is not " most efficacious when the leaves are out, " In winter, he considers spraying to be useless, but he advises the collecting and burning of the infected leaves.

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(1) Under the name "Schorf" are included the diseases produced by certain species of the genus *Venturia* (*V. pirina*). Aderh. on pear-trees and *V. inaequales* (Cooke) Aderh. on apple-trees. The conidial-stages of these two ascomycetes have been named respectively *Fusicladium pirinum,* (Lib.) Fuck, and *F. dendriticum,* (Wallr.) Fuck.

Cf. SORAUER, *Handbuch der Pflanzenkrankheiten,* 3 Auflage, B. II, pp. 248-249. Berlin, 1907. [*Ed.*].

1025 E. S. SALMON. **Cherry Leaf Scorch in Kent, England.** — (*Gnomonia erythrostoma* (Pers.) Auersw.). South-Eastern Agricultural College, Wye. (Department of Economic Mycology).

Great Britain: Kent.

This disease is seriously affecting the cherry orchards in certain districts of Kent. It can be recognised by the fact that the leaves which have been killed by the fungus remain firmly attached to the branch right through the winter on to the summer, and are usually to be found for several weeks after the flowering of the cherry.

A diseased leaf gathered in winter shows a number of minute black points on its under surface. Each of these is the beak of one of the fruit-conceptacles of a Pyrenomycete, *Gnomonia erythrostoma* (Pers.) Auersw. In the autumn the conceptacles are immature, but during the winter months the spores gradually ripen until the spring, when, being perfectly ripe and ready to infect a leaf, they are ejected just when the new leaves are unfolding. When one of the winter-spores reaches the surface of a young leaf, it immediately germinates, pierces the epidermis, and gives rise to a vegetative spawn (*mycelium*) which feeds on the leaf-cells. Large yellow flecks are formed, which presently turn brown, and ultimately the whole leaf shrivels up and dies, looking as if scorched.

Trees which have suffered from the disease for a number of years, show weak growth of wood; an increasing quantity of dead wood accumulates, and finally the tree dies.

As the spawn of the fungus stops short at the base of the leaf-stalk, never entering the branch, the radical remedy would be to pick off and destroy all the dead leaves hanging on the tree. But as this course is in practice difficult, the best way at present is to make two applications of Bordeaux mixture; the first, just before the flowers open; the second, soon after the petals have fallen.

M. MOREILLON. **Cryptogamic Diseases of *Prunus Mahaleb* L. in Switzerland.** — (Die Steinweichsel, *Prunus Mahaleb* L., von einem parasitischen Pilz veranstaltet). (*Schweizerische Zeitschrift für Forstwesen.* Vol. LXI, pp. 152-155, 1910). *Annales mycologici.* Vol. IX, N. 2, p. 197, Berlin, März, 1911. **1026**

Switzerland Vaud.

At the foot of the Vaudois Jura *Prunus Mahaleb* L. (1) has been greatly damaged by two fungi: *Cucurbitaria Pruni Mahaleb*, Allesch and *Myxosporium Pruni Mahaleb* n. sp.

These fungi attack the two year old floral buds and small branches which soon die, and they also develop on the axillary buds. When the disease attacks the same tree for several years, it causes an extraordinary ramification which resembles a very accentuated dichotomy.

R. BUBÀK. **A New Disease of the Mulberry in Bulgaria.** (Eine neue Krankheit der Maulbeerbäume). — (*Berichte der deutschen botan. Gesellschaft.* Bd. XXVIII, pp. 533-537, 1910) *Zeitschrift für das landwirtschaftliche Versuchswesen in Oesterreich,* XIV, Jahrg. Heft 3, p. 310, Wien, March 1911. **1027**

Bulgaria

A description of a new disease of the mulberry tree which is caused by a fungus belonging to the Tuberaceae, *Thyrococcum Sirakoffi*, Bubàk, n. sp. Its first appearance in Bulgaria dates from 1908.

The fungus does not attack the epidermis only, but also destroys the bark and the bast of the tree, leaving the woody mass naked.

Leaf-shedding in Conifers due to *Botrytis Cinerea*. (*Bd. Agr. and Fisheries.* Leaflet 234. London May, 1910. **1028**

Great Britain

A brief description of a characteristics of this disease attacking the seedlings of several species of conifers.

The following preventive measures are suggested: 1) Perfect cleanliness in the seed bed is of primary importance, and no dead or dying weeds, plants etc. should be left on the bed, as the *Botrytis* will infest these and go from them to the leaves of the seedlings. 2) Stable manure when used on the beds should be perfectly buried in the soil. 3) Low-lying situations should be avoided as nursery sites. 4) When the disease is present, the seedlings should be sprayed with a solution made of 11 lbs. sulphate of copper, 16 lbs. carbonate of copper, 1 lb. permanganate of potash, and 3 lbs. soft soap, dissolved in 100 gal. of rain water. 5) All diseased seedlings should be collected and burned.

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(1) Very frequently used as a stock for cherry trees and sometimes cultivated without grafting. See: L. H. BAILEY, *Cyclopedia of American Horticulture*, p. 1452, New York, 1907.

1029 I. A. OL. ***Phacidium infestans*, in Poland as a Parasite of Young Pines.**, (O *Phacidium infestans* Karst, kak Vojmojnom Vreditelie Molodikh Sosen). *Journal Boliesni Rastenii* (*Jour. of plant Diseases*) IV G. pp. 128-134, St. Peterburg 1910.

Russian Empire: Poland, Lublin

In November 1910, the Central Phytopathological Station at S. Petersburg received several young pine trees from the forests of Borov, which were suffering from a cryptogamic disease. Some of them, which were completely dried up, had the leaves covered by the fructifications of a fungus, whilst others showed green and still vigorous shoots by the side of the dead parts, or showed small scattered spots.

The examination of the samples revealed the presence of *Phacidium infestans*, Karst. (Discomycetes), which Karst discovered for the first time in Finland on the *Pinus sylvestris*.

The apothecia of this fungus, situated under the epidermis and on both the under and upper surface of the leaf, are spheroidal in form and about 0.5 mm. in diameter. The asci in the form of clubs from 92 to 117 µ in lenghth, by 16 to 18 µ, contain 8 spores, disposed in two rows, or occasionally in one. As all the known species of *Phacidium* are saprophytes, and as, on the, other hand, it is known that saprophyte plants may become parasites, the writer is of opinion that the present case is one of facultative parasitism.

The inspector of forests, Tolskim, who sent the infected material, dwells at length on the serious havoc caused by this disease in the forests of Borov, and points out that the attack of the fungus coincides with the thawing of the snow. The greatest damage is caused in the parts of the branches which have been under the snow, and more than anywhere else on those trees which grow on the northern slopes of the dunes, where they are exposed to the winds and storms.

On the hypothesis that this fungus is really a parasite, stringent measures should be taken to prevent it from spreading to the Conifer forests of Central Russia. The use of fungicides is recommended, but it has not been possible yet to decide which are the best and what doses ought to be given. In serious cases the parts infected should be cut and burned.

1030 F. D. HEALD and F. A. WOLF. **The Whitening of the Mountain Cedar, *Sabina sabinoides,* (H. B. K.) Small.** (*Mycologia,* Vol. II, pp. 205-212, 3 figs. tab. XXXI, 1910) *Annales mycologici,* Vol. IX, N. 2, p. 193. Berlin, März, 1911.

Germany

More or less extensive white patches appear on the trunks and branches of *Sabina sabinoides,* (H. B. K.) Small, especially when the plants are young. These patches are due to the action of a fungus, *Cyanospora Albicedrae* nov. gen. and spec. This new genus has affinities with that called *Ophioceras,* but the parasite of *Sabina sabinoides* is distinguished from *Ophioceras* by the presence of horizontal perithecia imbedded in the tissue of the stroma.

1031 A. A. ELENKIN. **An Epiphillous Lichen *Biatorina Bouteillei.* (Desmaz) Arnold, found in Russia on the Leaves of the Fir and Spruce.** (Ob epifillom Lichainickié, *Biatorina Bouteillei* (Desmaz.) Arnold, na khvoie eli i pikhti). *Journal Boliesni Rastenii* (*Journal of Plant Diseases*) IV. God., pp. 134-137, St. Peterburg, 1910.

Russia: Moscow.

Biatorina Bouteillei, (Desmaz.) Arnold, is stated to have appeared for the first time in the Conifer woods of Central Russia. This lichen, which was discovered in France on *Buxus* and described by Desmazires, who called it *Parmelia Bouteillei,* has spread to Germany and Western Europe. Mr. Elenkin found it last summer in a wood of young firs (20 to 25 years old) in the district of Podolsk, Government of Moscow.

The *Biatorina* attacks the bark of the branches, whence it passes on to the leaves, which it covers with a white film, hindering or preventing their function. The thallus, of a gray or greenish colour, is granulous in appearance; the section of the apothecium, pink with a white border, is no more than 0.1 to 0.2 m/m in diameter; the spores, to the number of 8 per ascus, are very small (10 to 15 μ long by 4 to 5 μ wide), colourless and with two segments. It is possible that the lichen in question is very common in other parts of the Russian Empire under its vegetative form: a network of hyaline hyphae on which the green of the gonidea stands out in relief.

Phanerogamous Parasites and Weeds. — Their Control.

1032 K. HANSEN. **Weeds and their Vitality.** — (Ukrudsfroets Forekomost og Levedygtighed) *Ugeskrift for Landmaend.* Aarg. 56, N. 10 pp. 149-151, Kobenhavn, Martz 9, 1911.

Denmark The following are some data from numerous investigations on the vitality of weeds:

1) During the ordinary sowing of Gramineae and Leguminosae a great quantity of the seeds of certain weeds is spread over the fields, according to Mr. Hansen, from 10 to 15 per square metre.

2) One single weed may produce a very large number of seeds: for instance wild carrot, 110 000, the camomile 310 000.

3) Preserved dry in the warehouse, the seeds of weeds retain their germinating capacity for 5, 7, 10 years, and an even longer time under ground.

4) Some seeds of weeds remain vital even when the cereals with which they are mixed have been milled. In one case, the seeds of weeds found in a half kilogram of meal were estimated at 20 000, and half of them were in a condition to germinate.

5) Weed-seeds may pass through the alimentary canal of animals, largely retaining their vitality.

Thus, in a single day a cow ate, with her fodder, 89 000 seeds of plantain and 564 000 seeds of camomile; and 85 500 and 198 000, respectively, of these seeds were found in the dung, apparently intact. Their germinating capacity was 58 % and 27 %.

B. BAHRFELDT. **Coleus as a Catch Crop for repressing Weeds in Coffee and Rubber Plantations.** (Een Nieuwe Tusschencultuur ter Onderdrukking van het Onkruid) — *Teysmannia,* 22 Jaargang, 1^{sde} Aflevering, pp. 27-29, Batavia, 1911.

Weeds are a great nuisance in rubber and coffee plantations; hence the importance a good intercalary crop, capable of keeping the soil « clean ».

After experimenting in Java for years, some species of *Coleus* have been found to be the best weed-suppressing crops ; they may be recommended for the following qualities :

1) Coleus are not creepers, and never grow beyond 1.3 to 1.7 metres.

2) The stem never becomes woody, which makes uprooting easy.

3) The soil is covered with a thick vegetation, which keeps down weeds.

4) Coleus adapt themselves to the most different conditions of place and climate: from coast to mountain, in damp soils and in dry districts.

5) Coleus do not hinder or damage in any way the growth of the plants which they protect.

Insects and other Injurious Invertebrates. Their Biology and Control.

C. GORDON HEWITT. **Report on Injurious Insects in Canada.** — *Departm. of Agric. Ottawa, Canada,* Jan. and Feb. 1911. **1034**

All shipments of nursery stock imported into Canada from Europe, Japan and the States of Vermont, New Hampshire, Maine, Massachusetts, Connecticut and Rhode Island are now inspected by the Canadian Division of Entomology for the Brown-tail Moth **Canada**

(*Euproctis chrysorrhœa* L.) and the Gipsy Moth (*Porthetria dispar* L.). A campaign of extermination of the Brown-tail Moth is also being vigorously carried out in Nova Scotia where it has been introduced and has established itself. The depredations of the Spruce Budworm (*Tortrix fumiferana*, Clemens) in the province of Quebec, throughout the whole of which it has now spread, have been studied. Budworm is defoliating and in some cases killing the tops of the spruce, *Picea spp.*, and balsam (*Abies balsamea* L.); and at present few species of parasites have been found attacking this pest, which is also injuring the Douglas Fir (*Pseudotsuga mucronata*, Raf.) in British Columbia.

Certain amendments have been made in the regulations issued under « The Destructive Insect and Pest Act » of 1910, governing the importation of nursery and florist stock into Canada. These amendments make Montreal and Halifax ports of entry for plants not requiring fumigation under the Act, and also permit the importation of certain classes of plants at any time of the year and through any port. These regulations as amended will be soon published in full.

1035 C. C. Gowdey. **Uganda Insect Pests.** — *Entomological Leaflet N. 2 Issued by the Cotton Department*, Uganda, 1909.

Parasites of plants.

Uganda

I. Cotton Pests:

1. Cotton Caterpillar (*Prodenia littoralis*, Bois).
2. Cotton Bollworm (*Earias insulana*).
3. Cotton Stainers (*Dysdercus nigrofasciatus*, Stal.).
4. Cotton Aphis (*Aphis Gossypii*, Glover). This pest injures the cotton by sucking the juices from the leaves. It does not often become destructive, and is kept under control to a considerable extent by many species of Coccinellid beetles.

Remedy: an application of kerosene oil emulsion.

5. Cotton Bollweevil (*Anthonomus grandis*, Boh.) Remedies: collecting; spraying with Paris Green, and early removal of the old cotton (1).

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(1) Paris Green is a copper aceto-arsenite. For ensuring against frauds the trade of Paris Green as an insecticide, see the various State laws in the United States: A. K. Haywood. *State laws governing the composition and sale of Insecticides*. U. S. Dpt. of Agriculture. Bureau of Chemistry. Bull. N. 76. Washington, 1903.

See also: Italo Giglioli. *Concimi, Mangimi, Sementi e Sostanze antiparassitarie*. Annali di Agricoltura. Roma, 1905, p. 574. [*Ed.*].

6. Grasshoppers. There are many species of grasshoppers which injure the foliage of the cotton plant; but the damage seems to be incidental.

Remedies: Paris Green; bran mashes; sweetened arsenite solution.

II. CITRUS PESTS:

1. The Orange Butterfly (*Papilio demoleus*, Linn.).

Remedies: collecting; spraying or dusting with Paris Green and lime.

2. Scale Insects (*Coccidae*): Long Scale (*Mytilaspis Gloveri*, Pack.); Purple Scale (*Mytilaspis citricola*, Pack.).

3. Plant Lice (*Aphis citri*, Ashmead). The first effect of the plant louse is the curling of the leaves. Consequently the plants should be treated with kerosene emulsion, or whale oil soap, before the leaves curl.

III. TOBACCO PESTS:

1. Cutworms (*Agrotis* sp.).

2. Tobacco Caterpillars. Leaf-eating caterpillars attack tobacco; some species do considerable damage by eating holes in the leaves. The most common is *Prodenia littoralis* and the Sphinx moth, *Protoparce carolina* (?).

IV. CACAO PESTS:

1. Thrips (*Heliothrips rubrocinctus*, Giard.). The larvae injure the crop by feeding on the leaves and on the pods. In addition to cacao, the cacao Thrips attack Liberian coffee (*Coffea Liberica*) and guava (*Psidium Guajava*).

Remedies: spraying with kerosene emulsion or with lime and sulphur mixture.

2. Scale Insects (*Stictococcus dimorphus*, Newstead). Remedy: spraying with whale oil soap.

In addition to feeding on this crop, *Stictococcus dimorphus* is recorded in other localities as infesting cotton, *Anona* spp *Hibiscus* and Sand box (*Hura* sp.).

3. Cacao Beetles: *Schizoncha* sp., *Adoretus hirtellus*, Lap. The life history of these insects has not yet been worked out, but undoubtedly the larvae feed on the roots, and on reaching the adult stage the beetles attack the cacao and banana leaves during

the night, and remain under the surface of the ground near the bases of the trees in the day.

Remedy: spraying with arsenite of lead or with Paris Green.

V. COFFEE PESTS:

1. Scale Insects: *Lecanium nigrum*; *Aspidiotus* sp.

2. Coffee Beetle (*Stephanoderes coffea*, Haged.) has done great damage to the coffee plantations in the Protectorate. It is a new species, whose life-history, until worked out by Mr. Gowdey, was not known.

The adult beetle lays its eggs when the beans are fairly well formed. After from 8 to 12 days the egg hatches into a small white footless grub, which begins to burrow into the bean. The larva requires 21-28 days to attain its full growth, and the pupal stage requires 15-18 days, after which the beetle emerges. The beetle feeds on the bean until it is ready to begin egg-laying, when it makes its way to the exterior.

VI. RUBBER PESTS:

1. Castilloa Borer (*Inesidia leprosa*, Fab.)

Remedy: Plugging the cavities caused by the dropping of the old leaves with a mixture of tar and clay, or crude carbolic acid and clay, so as to prevent the beetle from laying its eggs in these natural cavities.

2. Scale Insects (*Lecanium viride*, Green.).

The only variety of rubber on which this pest has been observed in great numbers is *Funtumia elastica*. The weak trees are all defoliated, only a few terminal leaves remaining on each branch; the leaves of the strong trees do not drop, although they may become blackened by the usual accompanying fungus.

VII. SWEET POTATO PESTS:

1. Sweet Potato Weevil (*Cylas formicarius*, Fabr.)

The eggs are laid singly on the tubers, and on hatching the grub begins tunnelling into the potato. Beetles do not attack tubers that are far below the surface of the ground, and, consequently, a deep rooting variety should be grown on infested land.

2. Sweet Potato Caterpillar. The vines of sweet potatoes are rapidly defoliated by the larvae.

VIII. PESTS ON THE KAFUMBO FIBRE (*Asclepias semilunata*).

1. Flea Beetle (*Phygasia sp.*). The life-cycle of this pest has not been worked out, but as a general rule the larvae of Flea Beetles make mines in the leaves between the upper and lower epidermis. The larvae pupate within the mines; the adults feed on the outside of the leaf.

Remedies: arsenite of lead and Paris Green.

2. Aphids (*Aphis* sp.).

IX. PESTS ON RICE:

1. Rice Hispa (*Hispa oenescens*, Baly).

2. Crickets. The species which is of great economic importance in the Protectorate is the mole cricket, *Gryllotalpa africana*, Pal.; it is extremely injurious to young rice.

Remedy: Flooding the land; this compels the crickets to come to the surface, when they are devoured by the birds.

X. PALM PESTS.

1. Palm Weevil (*Rhyncophorus phoenicis*, Fabr.).

2. Scale Insects (*Coccidae*).

XI. PARASITES OF ANIMALS.

1. Hen Louse (*Menopon pallidum*).

2. Chicken Mite (*Dermanyosus gallinae*, Redi).

XII. MISCELLANEOUS PESTS.

Scale Insects (*Coccidae*).

Termites or White Ants. They belong to the family *Termitidae* of the order *Neuroptera*, which includes the may-flies and ant-lions. The number of Termites in Uganda is incalculable, but fortunately their natural enemies (lizards, true ants, spiders, centipedes, rats, birds, toads, bats, etc.) are equally numerous.

CH. BERNARD. *Tetranyches sp.*, **Enemy of Some Cultivated Plants in Java.** — (Over eenige Mijten, indirect van belang voor de Theekultuur. B. Over eene Tetranychus, Welke voorkomt op de bladeren van Kina, Cassave enz.) — *Department van Landbouw. — Mededeelingen van het Proefstation vor, Thee*, N. VIII, pp. 6-13, Buitenzorg, 1910. **1036**

This is the detailed description of an Acarus of the genus *Tetranychus* (*Tetranychus* sp.), which attacked the leaves of some cultiva- **Java** ted plants at Java namely, Cinchona and Cassava, and will probably end by attacking the Tea plant also. This species is very similar to *T. bioculatus*, which is an enemy of the Tea plant, but differs from it by the colour of the eggs, which are whitish, whole those of the *T. bioculatus* are red. In the district of Bandorug, the nurseries of young quinquina have been seriously damaged by this insect; the lower surface of the leaves is covered with characteristic red-brown spots.

Intercalary cultivations and the capture of the insects is recommended for preventing the spread of the pest.

1037 G. MARTELLI. ***Phytonomus variabilis*, a Pest of Lucerne.** — (Primo contributo alla biologia del *Phytonomus variabilis* Herbst). *Boll. del Lab. di Zoologia generale e agraria della R. Scuola d'Agric. in Portici.* Vol. V, pp. 226-230, Marzo 13, 1911.

Italy: Naples Sicily

In April 1909, near Naples, at Portici, and in 1910 at Acicastello, in Sicily, Mr. Martelli found that serious damage had been caused to the young leaves of lucerne by the larvae and adults of a Curculionid, *Phytonomus variabilis*, Herbst. This parasite devours the leaves, and when these are finished starts on the parenchyma of the stem.

After some information on the biology of this beetle Mr. Martelli enumerates its parasites, which he found at Portici: an Ichneumonid (*Canidia Curculionidis*, Thoms.), two Calcidides (*Eulophus* sp. and *Eutelus*, sp.).

At Acicastello, in addition to *Canidia Curculionidis*, he found *Pimpla maculator* F.

At Portici he also found three parasites of the second degree; or hyperparasites of the *Phytonomus*: *Habrocytus* sp., *Chalcis* sp. and *Dibrachis boncheanus*, all three parasites of the *Canidia Curculionidis*.

1038 W. SEDLACZEK. **Migration of the Moths "Liparis monacha".** (Studien über den Flug des Nonnenfalters) *Centralblatt für das gesamte Forstwesen*, 37 J., 1-2 H., pp. 18-27 and 63-78, Wien, Jan. and Feb. 1911.

Austria: Bohemia

Dr. Sedlaczek states that the range of flight of insects depends greatly on temperature, and especially that migration presupposes certain limits of temperature both within and without their bodies. Basing his conclusions both on theoretical considerations and on numerous observations that he and others have made in Bohemia, Dr. Sedlaczak believes:

That the migration of numerous *Liparis monacha* from a forest which is attacked into other forests, immune or slightly attacked by the moths, is possible, but occurs very seldom.

A forester, however, should not limit his care to the development of the insect in the forests under his charge; he should also ascertain the condition of neighbouring forests.

L. Mercier. **On the Rôle of Insects in propagating Ergot of Gramineae.** (Sur le rôle des insectes comme agents de propagation de l'« Ergot » des Graminées). *C. R, de la Société de Biologie,* N. 8, pp. 300-302 Paris, Mars 3, 1911. **1039**

France

Microscopic sections of *Sciara Thomae*, a Dipteron very common in July near Nancy, has shown that the conidia of *Claviceps*, the fungus which causes Ergot in *Lolium*, are partly adhering to the hairs which cover the body of the insect, and partly contained in its digestive tube.

These insects visit often Perennial Rye-Grass, *Lolium perenne* L., many plants of which bear ergots. If the conidia eaten by the insect have not lost their germinative power, a point which can only be elucidated by experiment, it is evident that the *Sciara Thomae* plays an important part in the dissemination of the « ergot »; because not only does it carry a number of conidia stuck to its hairs, but ejects thousands of them in each defecation.

The biological researches made in the course of the last few years have shown that insects play an important rôle as agents for the diffusion and transmission of diseases among men and animals It is obvious that the same may be true for certain vegetable diseases.

P. Lesne. **Variations in Diet among Xylophagous Coleoptera of the Family of Bostrychida. Similarity of Diet between that of the adult Bostrychida and the Scolytida.** (Les variations du régime alimentaire chez les Coléoptères xylophages de la famille des Bostrychides. Parallélisme du régime chez les Bostrychides et les Scolytides adultes). *C. R. de l'Acad. des Sciences,* Tome 152, N. 10, pp. 625-628, Paris, Mars 6, 1911. **1040**

France

The Bostrychida, both in the adult and the larva stages, feed as a rule on the woody tissues of vegetables. Felled trees and dead wood which is more or less dried but has not undergone alteration, form the food most sought after by these insects ; but the wood must have been felled or have died recently. In tropical countries, wood which is to be worked is often rendered quite useless in a short time by these insects.

The Bostrychida are far from being exclusive in their choice of plants for nourishment, and not one of them is connected exclusively to a particular species. However, they seek especially the wood of trees belonging to certain botanical groups, such as the Mimosae and Bambusaceae, and several other species, such as the Vine and the *Ficus Carica* L. On the other hand, the whole family of the Salicinae appear to be quite free from their attacks.

The most striking evidence of the polyphagous character of these insects is that the same species are observed together in the most diverse nutritive mediums ; for instance, the *Heterobostrychus brunneus* Murr. and the *Dinoderus minutus* F. develop side by side in the wood of bamboo or in the dry tubers of sweet potatoes. The Bostrychida, however, sometimes abandon their xylophagous habits to feed on the starch reserves stored by certain vegetables in their underground tubers. This takes place, however, only when the tubers have been partially uncarthed and afterwards dried when the ground has been cleared by fire (tubers of *Smilax*, observed by E. A. Schwarz), or even when they have been taken from the soil and warehoused (tubers of Sweet Potatoes, Manihot and several species of *Smilax*). Under ordinary conditions, these tubers are not attacked by the Bostrychida.

Other reserve organs of plants (seeds of Gramineae: Wheat, Rice, Millet) are also the prey of these insects (for instance, *Rhizopertha dominica*, F., *Prostephanus truncatus*, Horn.) in tropical and subtropical countries. In this case also human industry appears to have been the cause of deviation from their ordinary diet.

Another peculiarity of the diet of the Bostrychida is that under certain conditions not yet determined, the adults of both sexes (for instance, *Schistoceros hamatus*, F., *S. cornutus*, Pall., *Tetrapriocera tridena*, F., *Apate monachus*, F., *A. terebrans*, Pall., etc.) attack the young, vigorous shoots and the living branches of trees, penetrating in the tissues and tunnelling through them; but they do not leave eggs there.

The same peculiarity may be observed amongst beetles of a very different group, the Scolytida, which in most cases consume live or freshly felled wood. Amongst them are the *Mylophilus piniperda*, L., *Solytus intricatus*, Ratz., *Hylesinus varius*, F., *H. vestitus*, Muls. and *Phlaesinus Thuyae*, Perr.

There is, therefore, amongst the Scolytida as amongst the Bostrychida, an instinct which drives the adult to attack young branches for the sole purpose of nourishment. The preference shown by the xylophagous Scolytides for trunks, and branches of a certain diameter, for the purpose of depositing their eggs, has been brought about simply by the saving of time and energy, effected by burrowing out a gallery capable of receiving a large nest of eggs without injuring its further development.

The way in which the usual diet of the Bostrychides has originated is more obscure and undoubtedly more complicated. But the comparison which has just been made with the Scolytides is likely to throw light on the question.

J. RUBY. **A Parasite of *Lecanium Oleae*, the Olive Cochineal.** — (Note sur un parasite de la Cochenille de l'Olivier). — *Ministère de l'Agriculture, Direction de l'Agriculture, Bulletin mensuel de l'Office des renseignements agricoles*, 10e année, N. 2, pp. 181-182, Paris, févr. 1911. **1041**

France: Bouches d Rhone. Italy. Algeria.

Mr. Ruby speaks of the appearance, during the summers of 1909 and 1910, of a small Hymenopteron, *Scutellista cynea*, Motsch., at Allauch, (Bouches du Rhône); it is a very useful natural enemy of the cochineal of the olive tree (*Lecanium Oleae*, B) and is very plentiful in this district.

The *Scutellista* was aided in its work of destroying the *Lecanium* by two lady-bird insects: *Chilochorus bipustulatus* and *Exochomus quadripustulatus* L. The writer verified the total disappearance in this way of the *Lecanium* from infected olive trees.

The *Scutellista* was found for the first time in France in 1905, at Montpellier and in the Department of Vaucluse. It has been known in Italy since 1863, and it was later seen in 1895 as a parasite of the fig-tree cochineal, (*Ceroplastes Rusci*, L.). It has also appeared in Algeria on the fig-tree and olive-tree cochineals.

1042 C. H. P. Powsod. **The Control of the White Scale Insect Louse ("Piojo blanco") of the Cotton Plant in Peru.** (La plaga del "piojo blanco" del Algodon en Piuria (Peru). Boletin de la Direccion de Fomento, Año VIII, N. 9, pp. 7-16, Lima.

Peru

Certain species of insects imported from Lima, Barbados and the United States of America have been found very useful in the control of the White Louse (« Piojo blanco »), which does such injury to the cotton plantations in the district of Piüra (Peru). Among these insectsare: *Aspidiotiphagus citrinus, Prospaltella aurantii, P. Berlesei, Aphelinus fuscipennis, Perissopterus pulchellus, Ablerus disiocampae, etc.*.

On account of their destructive activity and the rapidity with which they multiply, *Prospaltella aurantii* and *Aspidiotiphagus citrinus* give the best results. The females of the latter lay their eggs in the body of the larva of the "piojo", the small voracious larvae which issue from them causing the death of the host.

1043 G. Martelli. ***Saturnia Pavonia* L. and one of its Parasites.** (Brevi notizie sulla *Saturnia Pavonia* L. e su un suo parassita). — *Boll. Lab. di Zoologia generale e agraria della R. Scuola sup. di Agric. in Portici.* Vol. V, pp. 209-213, Marzo 2, 1911.

Italy: Calabria

The *Saturnia Pavonia*, L. is a night moth, the larvae of which are said by some to live on the leaves of the pear, apple, plum, blackberry, wild plum, elm, horn-beam and hawthorn. Mr. Martelli has found the larvae on the blackberry only, and he thinks that *S. Pavonia* may go through the whole of its development without passing on to some of the other plants mentioned above, contrary to the assertions of some writers.

As a parasite of the *Saturnia*, Mr. Martelli found a Dipteron at Catanzaro, in Calabria, which he recognised as *Masicera sylvatica*, Fall., which, like its host, has a single generation yearly.

1044 **Birds and Reptiles in the Control of *Euphyllura oleae*, an Olive Tree Pest.** See N. 1068 in this Bulletin.

H. Coupin. **Destruction of Insect Enemies of Plants by Volatile Substances.** (Sur la destruction des insectes nuisibles aux plantes par les substances volatiles). — *Bulletin de la Soc. Nat. d'Agric. de France.* N. 10, pp. 884-886, Paris, Déc. 1910. **1045**

See this Bulletin Jan. 1911, N. 39, p. 42.

Dané. **Controlling Vine and Fruit- Tree Pests.** (Emulsion contre les Chenilles et les Larves des Arbres fruitiers et de la Vigne). — *Le Moniteur d'Horticulture,* 35 année, N. 6, pp. 71-72, Paris, Mars 25, 1911. **1046**

France

Mr. Dané made some experiments in 1910 with an emulsion against the caterpillars and larvae of fruit trees and vines, with good results.

The following is the formula he recommends for a good emulsion:

a) Formula without coal-tar:

Soft soap 300 gr.;
Water ½ litre.

Mix hot in an earthenware jar, stirring all the while. When the mixture is quite homogeneous it is allowed to get cold, and the following is then added: Commercial ammonia, 1 litre. Mix again and then add little by little: Petroleum 1 litre. Sufficient water is then added to make 80 litres.

b) Formula with coal-tar:

The same formula, only before adding the half-litre of water to dilute the soap, a hot mixture of the soap and coal-tar is made, then the water is added and the ammonia, petroleum etc. The ammonia by the addition of petroleum, has stronger insecticide qualities than nicotine, which is expensive and not very active. The ammonia mixture has strongly alkaline properties without being dangerous to the workers like arsenical compositions. This emulsion may be used against all larvae, caterpillars and moths of every kind. It kills insects both by asphyxia and by poisoning. The materials cost very little; both ammonia salts and the potash in the soft soap are fertilisers for the trees.

Treatments with this insecticide may be preventive, but they are rather for « immediate » use. As soon as the slightest formation of webs or threads is seen, spraying should be done two or three times, at intervals of two days, with a jet in the case of isolated trees, and with a fine spray in the case of vines and espaliers, so as to wet thoroughly the tree.

1047 T F. Main. **Controlling the Potato Moth (*Lita solanella*).** — *Annnal Report of the Department of Agriculture for* 1909-1910: *Bombay Presidency:* pp. 34-35. Bombay, 1910.

India: Bombay

At Belgaum and Dhárwár a series of experiments has been carried out in order to ascertain the best method of storing potatoes so as to protect them from the potato moth (*Lita solanella*); the females lay their eggs in the « eyes », and the caterpillars which rapidly hatch, penetrate into the tubers and destroy them.

Preventive measures are:

ai) Preliminary treatment to destroy the eggs or caterpillars by fumigation with petroleum (better than benzine) at the strength of 4. oz. per 16 cub. ft. of space for 24 hours. *b*) After fumigation storage of potatoes in sacks, taking care to turn them out regularly every three weeks and remove the diseased tubers.

1048 H. Faes. **Remedies Tried in 1910 in the Vaudois Vineyards for the Cochylis Worm Pest.** — *La Terre Vandoise,* N. 8-11, pp. 79-115. Lausanne, 25 févr. 18 mars, 1911.

Switzerland: Vaud.

Owing to the state of the weather in 1910 the *Ortel ferments* made hardly any effect on the adult cochylis, although they attracted certain insect species.

The Ortel ferment, in the form of paste mixed with a little water, is put into glass bottles, which are pierced in a particular way at the top. The odour given off by the resulting fermentation attracts the insects into these bottle-traps.

The *straw bundles* as well as the *rag-traps* arranged to collect the pupae of the first generation have not given satisfactory results.

As regards the substances added to the cupric solution, used in the spraying, it was found that chloride of baryum at only 1 % was enough to distinctly burn the leaves and grapes, without being an efficient remedy for the cochylis.

Paris or *Schweinfurt Green* maintained the good results already noted in the experiments of 1909. At the second examination carried out on Sept. 3rd, at the time of the second generation, on the stocks treated with Bordeaux mixture to which Schweinfurt Green had been added there were two or there worm-eaten grapes on each bunch; while on the control stocks there were four.

Concentrated tobacco juice added to Bordeaux mixture gave in 1910 results far superior to those of 1909.

After the first treatments on June 2nd and 29th, the average gave less than one worm on each bunch, while the control vines showed three to five worms per bunch.

After four nicotine sprayings, the stocks showed less than one worm-eaten grape per bunch.

The Vaudois Department of Agriculture has decided to make experiments on a large scale this year with concentrated tobacco juice. The tobacco juice is to be added to the cupric mixtures at the time of the four usual sprayings.

The Dufour solntion: (Soap 3 %, Powder of pyrethrum 1.5 %) was applied in June 24th and August 27th, with satisfactory results.

At the examination less than one worm per bunch was found on the treated vines, but six per bunch on the control vines. The drawbacks to this treatment are:

1) the high price of the solution;

2) the difficulty of obtaining powder of pyrethrum of good quality and fresh;

3) the impossibility of applying a special treatment of this kind to any large extent simultaneously with the usual sprayings and sulphur dustings.

S. W. Foster and P. R. Jones. **How to Control the Pear Thrips.** *U. S. Dpt. of Agriculture. Bureau of Entomology.* Circ. No. 131. Washington. Jan. 9. 1911. **1049**

United States

The pear Thrips (*Euthrips Pyri*, Daniel) can be controlled by thorough spraying on any variety of the deciduous fruits grown in the infested areas of California. The sprayings necessary to control the thrips are expensive, but the outlay of money and labour gives large returns. Many experiments in spraying have given net returns of from $ 100 to $ 600 per acre more than was secured from adjoining untreated areas.

The Thrips work rapidly, and may destroy all prospects of a crop in less than a week. Spraying, to be successful, must be done thoroughly, and in time to kill the Thrips before the fruit-buds have been destroyed.

Those who can do so successfully are advised to irrigate and plough in the autumn. This is to be followed by thorough spraying the following spring. When the Thrips begin to appear on the trees in numbers, spraying should be done thoroughly, using high pressure, holding nozzles close to buds, and *directing the spray directly into the ends of the buds, and not against the sides.*

Growers should not attempt to spray too many trees with one machine. More profitable returns will be gained by spraying half the orchard thoroughly and at the proper times than by spraying all the orchard poorly at one time.

Results of the work in 1909 and 1910 show conclusively that one application is not sufficient when the Thrips are abundant.

A tobacco extract containing 2 ³/₄ % nicotine diluted at the rate of 1 to 60 in a 6 % distillate-oil emulsion forms the most efficient spraying material.

Formula for the soap:

Water	6 galls
Lye (98 %)	2 lbs
Fish oil	1 ½ galls

Formula for distillate-oil stock emulsion:

Hot water	12 galls
Fish-oil or whale-oil soap	30 lbs
Distillate-oil (raw) 30° to 34° Baumé	20 galls

1050 **Pruning as a Preventive of the *Diaspis* of the Mulberry Tree in Piedmont.** (Lotta indiretta contro la *Diaspis* del gelso). — *Il Coltivatore*, Anno 57, N. 4, p. 149, Casale Monferrato, Feb. 20, 1911.

Italy: Piedmont

An indirect war is being waged against the *Diaspis*, in imitation of the Japanese, who grow the mulberry trees in hedges or as shrubs, pruning them every one or two years, and in this way make it impossible for the scale-insect to live on the plant, since it develops only on branches 2 or 3 years old. In this way, dwarf mulberry trees are obtained, either ungrafted with "wild" leaves which may be pruned every year, or grafted specialised mulberry trees with "cultivated" leaves, which may be pruned every two or three years, with the result that the development of the *Diaspis* is greatly restricted.

For the purpose of encouraging the struggle against *Diaspis* a competition has been started in the province of Cuneo, in Piedmont, with prizes for plantations and hedges of black mulberry trees.

A. BERLESE. **Experiments in 1910 against the « Olive Fly », *Dacus Oleae*.** — (Esperienze del 1910 contro la « Mosca delle olive » eseguite sotto la direzione della R. Staz. di Entom. agraria, Firenze). *Redia*, Vol. VII, fasc. 1, pp. III-155, tav. III, Firenze, 1911. **1051**

Italy: Apulia, Tuscany

Two olive groves were selected for the purpose; one in Apulia (Carovigno), and the other, very far from any other olive groves, in the Tuscan Maremma (near Orbetello). In the first, experiments were made with fly-poisoning mixtured diluted with water, while vessels containing the untiluted mixture were used in Maremma.

The experiments in Apulia showed:

1) The decided attraction which water has for the fly, if pots containing water are within the olive groves during hot days and in districts where there is little moisture, as in Southern Italy.

2) The absolute inefficacy, — as far as the fly is concerned — of general spraying of the olive groves in July with fly-poisoning mixtures.

The experiments in Maremma showed that the mixture used, although made with abundant fruit paste and kept in a syrupy state, had no attraction for the fly, and in all probability, no useful effect for the olives.

Mr. Berlese therefore dwells upon the fact, made manifest by these experiments, that it is not the presence of sugar in the mixtures which is of importance in the control of the fly but rather that of the water, and more particularly of sea-water.

The vessels containing the liquid should be placed in the olive groves in May and left there until all danger from the fly has passed, which will be shown by the absence of insects.

Sprayings are useless, at least for districts with climatic conditions as in Apulia.

The experiments show that spraying with sugar mixture causes a strong development of *Fumago* on the trees. Against *Fumaqo*, salts of copper seem to have no effect; experiments should be made with powerful remedies, such as strong doses of tar, or corrosive sublimate.

The use of vessels placed throughout the olive groves, in the minimum proportion of 2 per hectare, and kept full of sea water or fresh water, is very efficacious at least in Southern Italy. But the treatment must be quite general and simultaneous on the part of all the olive-growers of a district, unless the olive groves are separated from one another by distances of several kilometres.

1052 G. GASTINE. **Saponin in Insecticide Emulsions.** — (Sur l'emploi des Saponines pour la préparation des émulsions insecticides). — *C. R. de l'Acad. des Sciences.* N. 9, pp. 532-535, Paris, Feb. 27, 1911.

France: Algeria.

The fruit of *Sapindus utilis*, a tree which has been cultivated for a long time in Algeria, contains in its fleshy pericarp more than 50 % of a special saponin very soluble in water and alcohol (1).

It is well known what difficulties are encountered in the preparation of Italian mixtures for controlling Diaspidae, on account of the instability of the emulsions obtained with the addition of sea salt and wheat flour; on the other hand, the alkaline soaps, while giving stable emulsions, rapidly weaken the toxic energy of the oils of tar and of raw petroleum. Mr. Gastine's experiments show that 20 gr. of powder of the pericarp of the *Sapindus* seed is sufficient for making an emulsion of 700 gr. of coal-tar oil in 10 litres of water. The emulsion, which is very stable, is so fine that a very large proportion of it passes through filter paper; under the microscope it has the appearance of milk.

Salts of copper may be added to emulsions of coal-tar oil without the superficial tension of the liquid being increased. The liquid is thus suitable for controlling both naked Coccidae and Aphididae, as well as Fumago. The following formula is for a cupric emulsion:

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(1) According to Trabut, *Sapindus utilis* contains 38 % of Saponin.

TRABUT, Pharm. Journ. 1896, p. 300. Quoted in C. WEHMER. *Pflanzenstoffe* Jena, 1911, p. 463.

For the Soap Nut Tree of North India (*Sapindus Mukorossi*), and that of Sonth India (*S. trifoliatus*). See G. WATT., *Econ. Prod. of India*, vol. VI, p. 468. *S. trifoliatus* contains in its fruits 11.5 % of Saponin. [*Ed.*].

Water 10 litres, powder of *Sapindus* 20 gr., neutral acetate of copper 100 gr., mixture of coal-tar oil and petroleum of 1.0 density 200 cub cm.

The property of wetting well, which is characteristic of saponins, is a very necessary quality for anticryptogamic and insecticide liquids.

On the preparation of the Sulphide of Calcium Mixture. See N. 1000 in this Bulletin. 1053

Insects injurious to special Crops.

D. B. MACKIE. **An Outbreak of Destructive Caterpillars in Batangas Rice Field.** — *The Philippine Agricultural Review*, Vol. III, N. 12, Manila. December 1910. 1054

Philippines

In March, 1909, an enormous quantity of larvae of *Spodoptera maurita* made their appearance in the district of Batangas, between Mount Maquiling and Lake Taal, almost completely destroying the rice crop. These larvae, which measure about 36 mm. in length and whose backs are of different colours, creep up the stems, begin by devouring the small leaves, and end by destroying the whole plant.

They afterwards burrow into the soil, where, at a depth of from 5 to 7 cm., they turn into chrysalides; this is the best moment for killing them in large quantities, by tilling the soil. It is also recommended to spread the « Tachina Fly » in the district; this is a small Diptera whose larva penetrates the body of the *Spodoptera* larva, killing it within a few days.

O. FALLADA. **Diseases and Pests of Sugar Beets in 1910.** (Ueber die im Jahre 1910 beobachteten Schädiger und Krankheiten der Zuckerrübe. Serie IV, N. 22).— *Oester. Ung. Zeits. für Zuckerindustrie und Landw. XL Jahrg.*, 1 *Heft*, pp. 29-40, 4 fig. 1 Taf. Wien, 1911. 1055

Austria Hungary

An enumeration of the various diseases caused by animal and vegetable parasites discovered amongst sugar beets in varions parts of the Empire in the course of 1910.

Among the animal parasites are: some Elateridae (*Agriotes lineatus* and *A. obscurus*) *Gryllotalpa vulgaris, Silpha* spec., *Atomaria linearis, Cleonus* spec., *Haltica* spec., *Aphis* spec., *Heterodera Schachtii,* Schmidt.

Among diseases due to vegetable parasites the following may be cited : the « root rot », caused by *Phoma Betae,* the « heart rot », of the Beet (1), the « root rot » due to *Rhizoctonia violacea,* the « root hernia », as to the cause of which the various writers have not yet agreed, several diseases of the leaves due to *Peronospora Schachtii, Cercospora beticola, Clasterosporium putrefaciens,* etc.

1056 H. UZEL. **Parasitic Insects of the Sugar Beet.** (Ueber die auf der Zuckerrübe in Böhmen lebenden Kleinzirpen). — *Zeits. für Zuckerindustrie in Böhmen.* XXXV Jahrg., Heft 5, pp. 285-292, Prag; Feb. 1911.

Austria: Bohemia

Sugar-beet plantations in Bohemia are often seriously attacked by different insects, among which the following are very numerous: *Cicadula sexnotata,* Fall. ("Zwergzikade"), *Chlorita flavescens,* Fab. ("Rübenzikade ») and *Chlorita Solani,* Koll. The following are also very numerous at times; *Eupteryx Carpini,* Fourc. = *Typhlocyba picta,* Fb. (Kartoffelzikade) and *Philaenus spumarius* L. = *Aphrophora spumaria* L. ("Schaumzirpe"), numerous individuals of which have been found in Denmark killed by *Entomophtora Aphrophorae,* Rostr.

Less numerous but found in many localities is *Thamnotettix tenuis,* Germ.

Lastly, here and there, are found; *Deltocephalus striatus* and other insects belonging to the genus *Thamnotettix, Deltocephalus, Athysanus, Eupteryx, Liburnia* and *Pediopsis.*

The writer describes many of these pests, which, he says, do not confine themselves to attacking the sugar beet, but extend their ravages to other plants such as clover, potatoes, vetch, larkspur, lupin, chicory, hops, conifers, wheat, maize, the vine, strawberries and other plants of less importance.

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(1) "Heart rot" is due, according to Griffon and Maublanc to *Phoma tabifica.* See this Bulletin no 2. Dec. 1910, p. 360 [*Ed.*].

W. H. PATTERSON. **A Scale- Insect on the Cotton Plant in St. Vincent, W. I.** — *Reports of the Botanic Station, Agricultural School, Land Settlement Scheme and of the Government Veterinary Surgeon, S. Vincent.* 1909-1910, p. 20, Barbados, 1910. **1057**

Windward Islands: St. Vincent

An injurious scale-insect was found in some cotton plantations in October 1909: *Saissetia nigra = Lecanium nigrum.*

Zalophothrix mirum, the natural enemy of this insect, may be used successfully in the control of the scourge. The larvae of a species of *Tinaea* which is not yet well determined burrow long galleries in the axillary parts of the plants, but without causing much damage.

F. A. STOCKDALE. **Sweet Potato and Cocoa Nut Palm Pests.** (Report of the Botanic Gardens and their Work for the year 1909-10. Pp. 14 and 16. Georgetown. Demerara, 1911. **1058**

British Guiana. Jamaica. Florida.

On certain lands at Mahaicomy the sweet potatoes were attacked last year by *Cylas fermicarius* («Sweet Potato Weevil»). The crops growing in the back lands were more seriously affected than those situated on the sandy soils.

This in the first occasion in which this insect has been recorded in British Guiana; so far it has been unknown in any of the West India Islands, except Jamaica, although it is common in Florida and other Southern States.

In Georgetown and around Mahaicomy the caterpillar pest (*Brassolis sophorae*) of Cocoa Nuts was common during the early part of the year.

The best remedy is to carefully destroy the «nests» in which the larvae rest during the day.

Cane-Borers on the Louisiana Upper Coast. — *The Louisiana Planter and Sugar Manufacturer.* Vol. XLVI, N. 1, January 7, 1911; pp. 2-7. New Orleans. **1059**

United States: Louisiana

I. *The Cane-Borers on the Upper Coast.* — The damage done by the cane borers (1) on the Upper Coast is a matter of serious importance. Mr. R. G. Comeaux, of Iberville, communicates that before the cane-borer invasion, with a good three-roller cane mill and shredder he got 123 pounds (55.72 kg.) of open kettle centrifugal sugar per ton (1015.04 kg.) of cane. Later, and since the invasion of the cane-borer he erected a six-roller mill, and yet was unable to secure more than 102 pounds (46.20 kg.) of similar sugar per ton of cane ground, with a loss of 25 per cent.

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(1) *Daetraea saccharalis,* Fabr.

The larva of the insect commits great depredations in sugar cane fields by boring into the stalks, often thereby setting up putrefaction, so that the stalks become worthless. (GEORGE WATT, *Dictionary of the Economic Products of India.* Vol. VI, Part. II, p. 122. London, 1893). (*Ed.*).

II. *Cane Borers and Trash Burning.* — While the cane borers were not nearly so bad in the Louisiana sugar belt generally in the season of 1910 as in 1909, in several districts during the recent (1910) manufacturing season, they were reported to be exceedingly numerous and very damaging.

In many canefields of the Iberville district where complaints were loudest, there is still continued a practice which must be largely responsible for the continued breeding of cane-borers on the plantations. This is the desultory, scattered, and very imperfect burning off of the cane trash in recently cut cane fields, the left-over trash and tops of the harvested cane being the favourite and most prolific breeding place of the cane-borers.

In raking up the cane trash on top of the rows after rolling, and leaving it there until it becomes dry enough to be completely consumed by fire, two important purposes are served; viz. the destruction of the larvae and the preservation of the stools from winter frosts.

1060 K. A. Ballou. **White Ants. Report on the Prevalence of some Pests and Diseases in the W. Indies for the Year.** 1909-10. *West Indian Bulletin, Journal of the Imp. Agric. Dept. for the W. Indies* Vol XI. n. 2. p. 86 Barbados 1911.

West Indies: St. Kitts

The report of the entomologist of the Dept of Agriculture for the West Indies states that the sugar canes were badly attacked on one estate in S. Kitts by termites during several years. They ate out all the interior of the cane stems and entirely destroyed the crop over a considerable area. About 100 acres were planted with cotton for two or three years and have now been replanted with canes. These have made vigorous growth and show no signs of attack, which indicates that the remedy has proved effective.

1061

I. D. KORANTENG. **An Hemipteron Injurious to the Cacao Plantations on the Gold Coast.** — *Report of the Agr. Dpt. for the Year* 1909. Pp. 8-9 Gold Coast, 1910.

Gold Coas

An hemipterous insect, called " sankonawoabe " caused considerable damage to the cacao plantations throughout the Colony and its Dependencies during 1909; in some cases plantations have been entirely ruined, and there is every indication of the pest rapidly increasing unless active measures are taken by the farmers to check its progress. The insects puncture the bark of the trees, and suck the sap, thus causing the bark to split open and the branches eventually die.

Young trees are quickly attacked and generally perish.

Active measures are being taken by the agents of the Gold Coast Dept. of Agr. to eradicate the pest. The travelling teachers have visited all the principal villages where cacao is being grown throughout the Colony and its Dependencies and instructed the farmers how to fight the evil.

The native travelling teachers carry a portable sprayer, pruning implements and the necessary ingredients for making kerosene emulsion, and demonstrate their various uses in the villages they visit. In the chief villages a few cacao trees are pruned, the land cleared of bush etc., the old cacao husks burned or buried, and, where necessary, dense foliage thinned out, drains made, and the trees sprayed with kerosene emulsion.

1062

D' UTRA. **Insects Injurious to Maté.** (Maté or Congônheira), — *Secretaria da Agric. Com. e Obras publicas do Estado S. Paulo. Bol. de Agric.* 11ª Serie, pp. 582-583, Sao Paulo, 1910.

Brazil:
Saô Paul

The Maté tree is relatively little attacked by insects, if the " serradones " and " curuqueré " be excepted.

The " serradores " are the long horned Coleoptera of the family of *Cerambycidae*, the most injurious of which are *Oncideres amputator*, Fabr. and *O. heterocera*, Thompson.

The " curuqueré " belong to the family *Noctuidae* and are the insects which ravage the cotton plant; they are, *Noctua Gossypii*, *Aletia argillacea* (= *Alabama argillacea*, Hübner).

1063 CH. BERNARD. **An Acarus which attacks *Indigofera galegoides* in Java.** (Overeenig e Mijten, indirect van belang voor de Theecultur. A. Eene gal op *Indigofera galegoides* veroorzaakt door eene Mijt). — *Department van Landbouw. Mededeelingen van het Proefstation voor Thee,* N. VIII, pp. 1-6, Buitenzorg, 1910.

Java An Acarus of the genus *Phytoptus,* which the writer believes to be a new species., is attacking in various parts of Java, a Leguminosa, *Indigofera galegoides,* generally used as a green manure.

These insects cause the formation of numerous small finger-like tumours on the upper and lower surfaces of the leaves, which when plentiful interfere with the active functions of the leaf. The inner part of the rather thick wall of these swellings is covered with short, thick hairs, amongst which hide numerous Acari in various stages of development.

Very little harm has been caused so far, but it would become serious should this species of *Phytoptus* begin to attack the tea plant, which is not improbable.

1664 C. L. MARLATT. **The Periodical Cicada in 1911 in the United States.** — *U. S. Department of Agr., Bur. of Entomology; Circular* N. 132, pp. 1-6, Washington, Feb. 1911.

United States *Tibicen septemdecim,* the periodical Cicada, damages shade trees, and kitchen gardens over a vast extent of country in the United States, from New York and Pennsylvania to the mouth of the Missisipi. When laying their eggs, the females bore through the bark of the young branches and thus cause a great alteration in their constitution. Kerosene emulsion and solutions of carbolic acid, etc. are powerless to destroy the insect. The best results are obtained with milk of lime or Bordeaux Mixture. It is also recommended to attack the insects directly, shaking the branches at dawn and collecting and killing those Cicadae which have gathered on them during the night.

1065 F. PICARD. **The Moths of the Vine.** Les Noctuelles de la Vigne) *Le Progrès agricole et vitivole,* 28^e année. N. 6, pp. 166-172 Montpellier Feb. 5th, 1911.

France The following are the species of moths which are most frequent in the French vineyards:

Agrotis segetum (Dart Moth)

Agrotis exclamationis (Heart and-Dart Moth)
Agrotis pronuba
Garandrina exigua
Agrotis crassa)

The caterpillars of these moths, which are generally called « gray caterpillars », are particularly fond of the tender tissues.

They are especially harmful when the vinebuds begin to open and sometimes cause considerable damage in a single night. The most redoubtable parasite of the gray caterpillar is a fly, the *Echinomya prompta,* which prevents it from multiplying indefinitely.

There are several methods of control, early tillage of the soil, destroying the insects by hand, using insecticides, and preventing the insects ascending the stocks. For the collection of the insects by hand, the work must be done during the night. Several insecticides have been tried, poison baits being spread about the plants, and poisonous substances, such as carbon disulphide or a kainite solution, have been mixed with the soil, but these insecticides are dangerous for the plants.

A better method is that of preventing the insect from reaching the plant by putting barriers in its way, and for this purpose the stem of the vine may be surrounded with bands of oil cloth, zinc funnels or cotton wads, etc; this method, however, is too expensive.

The writer advises putting round the stem a ring of the following preparation:

Norway tar	2 parts
Coal-tar	1 »
Heavy oil	1 »

This mixture absolutely prevents the caterpillars from climbing; two applications, with an interval of 12 or 15 days between, are sufficient.

L. CAESAR. **The Codlin Moth.** — *Bulletin N°. 187, Ontario Agricultural College, Ontario Department of Agriculture.* Toronto, Canada. · **1066**

Canada: Ontario

This is a comprehensive treatise on the Codlin Moth (*Carpocapsa pomonella*) which is stated by the writer to be the most destructive apple and pear pest in Ontario causing an annual loss of about two million dollars. The place of origin, means of distribution, injury caused, life history, habits, etc., are fully dealt with and there are helpful illustrations from photographs. Clear instructions for combating the insect are given, including the destruction of fallen and wormy fruit, banding trees with cloth or burlap, preventing moths from escaping from the fruit house, and spraying. The bulletin concludes with a summary of rules for spraying as follows:

1. Shortly before, or as the leaf buds are bursting, use lime-sulphur, either commercial or home-made, corresponding to the strength of the commercial, diluted 1 gal. to 10 gals. with water. No poison as a rule is necessary. This application kills San José Scale, Oyster-shell Scale and Blister Mite, and helps to ward off Cankers, and Apple and Pear Scab.

2. Just before the blossoms burst, use commercial lime- sulphur diluted 1 to 30 or 35, or Bordeaux mixture (4 : 4 : 40), and 2 lbs. arsenate of lead to each 40 gals. This application is to destroy all early feeding caterpillars, such as Tent-caterpillars, Case-bearers, Canker Worms and Bud Moths, and to help against Apple and Pear Scab and Cankers.

3. Immediately after the blossoms fall, use the same mixtures as for N°. 2, but the lime-sulphur need not be stronger than 1 to 40 nor the Bordeaux than 3 : 3 : 40. This application is chiefly to control Codlin Moth and Apple and Pear Scab, but also helps greatly against Lesser Apple Worm and Plum Curculio.

4. If a fourth application is given, it should be about 3 weeks after the blossoms fall and with the same mixtures as N°. 3, except that if the season is dry the fungicide may sometimes be omitted. This application assists in holding the Codlin Moth in check in the warmer parts of the Province, and in moist climates is often necessary for the thorough control of the Apple Scab.

N. B. — Thoroughness is the great secret of success.

1067 H. E. Hodgkiss. **The Apple and Pear Membracids.** — *New York Agricultural Experiment Station. Technical Bull.* N. 17, pp. 81-113, Genova. Dec. 1910.

United States

This Bulletin deals with the study of some Membracids which damage the apple and pear trees in various parts of the United States. The insects appear towards the middle of July. In 1908, the first individuals of *Ceresa bubalus* were seen on July 2nd, but they became numerous only towards the middle of the month. In 1910, a large number of adults of *Stictocephala inermis* were collected on July 12th, at which period *Ceresa bubalus* and *C. borealis* were still rather rare.

The adults are not satisfied with damaging the pears and apples, but also attack other plants, feeding on the tender tissues and laying their eggs on the buds or the bark of the young trees.

In consequence of the numerous incisions which they make when laying their eggs, the branches become weakened and the growth of the plant is considerably retarded.

The following may be cited amongst the number of plants which furnish nourishment for the larvae in the first stages of their development:

Pastinaca sativa L., *Arctium Lappa* L., *Erigeron annuus* Pers., *Daucus Carota* L., *Cirsium arvense* Scop., *Cirsium lanceolatum* Hill., *Verbascum Blattaria* L., and *Aster Novae-Angliae L.*

Among the natural enemies of these insects, *Polynema striaticorne* Gir. and *Ottys Ceresarum* Ashm. attack all the species, and destroy a large quantity of eggs.

The following is advised as a remedy against Membracids:

1) Careful destruction of the weeds on which the larvae feed;

2) Good pruning, care being taken by the use of manures and in other ways to stimulate the plants to strong growth, thus rendering them in a condition to resist the innumerable wounds inflicted by the insects.

A. F. DE SEABRA. **The *Euphyllura oleale*, injurious to the Olive Trees.** (Algodâo branco or *Euphyllura Oleae*, Fons Colombe) *Portugal Agr.*, 22° anno, n. 2, pp. 24-28, 4 figs. Lisboa, 15, Jan. 1911. **1068**

Portugal

The floral extremities of the branches of the olive tree are sometimes covered with a substance similar to tufts of cotton; they are pure white having a waxy appearance with a viscous consistency. This substance is produced by the larvae of a Hemopteron, the *Psylla Oleae* or *Euphyllura Oleae*.

The puncturing by the larvae, causes the branches to lose their fruit; and new ramifications often shoot out, which do not become covered with the white waxy fluff but notwithstanding do not bear fruit.

Mr. de Seabra mentions the following amongst the insecticides, which are of use against this parasite:

1) Solution of copper sulphate and ammonia (Common soap 3 kg., copper sulphate 500 gr., ordinary ammonia 1 litre, water 100 litres).

2) Dilute solution of soap and petroleum (soap 500 gr., boiling water 5 litres, petroleum 6 litres).

3) Infusion of tobacco (obtained by soaking tobacco in water, or by a 1 to 2% solution of tobacco extract in water).

4) Quick-lime solution, used alone or mixed with soap (1 kg. in 20 litres of water).

5) Dusting with sulphur (a little quicklime being mixed with the sulphur).

The remedy must be applied, as soon as the first floral buds appear, with very fine sprayers, care being taken to avoid overcharging the leaves, and especially the flowers, with the insecticide.

Treatments made in summer and autumn are of little use. If the attack of the insect is not very serious, it is best to prune the branches, burning the parts attacked.

The *Euphyllura Oleae* has also numerous natural enemies amongst birds and reptiles, of which the following may be mentioned: *Phylloscopus collybita Vieil.. P. Bonelli* Vieil., *P. trochilus* L., *Nypolais polyglotta* Vieil., H. *pallida Ehr.*, which are known in Portugal under the common names of « Felosas », « Fuinhas », or « Furifolhas », *Parus caeruleus L.*, («Chapim pequeno ») and *P. major L.*, which is also called « Megengra » in the country, as well as « Cedovem », « Patachim », « Fradiscos », « Paracaim », « Cachapim », etc; *certhia familiaris* (« Trepadeira »), *Anthus pratensis, A. campestris* L. (« Petinhas » or « Sombrias ») and *Mutacilla alba* L. (« Alveolas »).

Amongst the useful reptiles, the following are some of the smaller ones: *Psammodromus algira* L., *Lacerta muralis* Laur., *Acantodactylus vulgaris* D.B., etc., known under the common names of « Lagartixas » or « Sardaniscas ».

1069 I. D. KORANTENG. **A Leaf Beetle Injurious to the Oil Palm on the Gold Coast.** — *Report of the Agricultural Department for the Year* 1909. Gold Coast, 191.

Gold Coast A leaf beetle was found damaging the leaves of the oil palm in some districts. It has been classified by the Government entomologist of Southern Nigeria as belonging to the *Hispidae* a sub-family of the *Chrysomelidae*. The beans when attacked by this insect present the appearance of being scorched and eventually fall off. According to native information this pest was unknown in the Colony until the early part of the year. Recent reports show that the disease is spreading.

E. Henry. **The Chief Forest Pests in France.** (Principaux Insectes nuisibles aux forêts françaises) *Annales de la Science agronomique française et étrangére*, 28e année, n. 2, pp. III-118, Paris, Nancy, Feb 1911. **1070**

France

During recent years there has been a marked recrudescence of injurious insects in the forests in France. The following may be noted amongst the main causes of the increase of the evil: frequent storms, a succession of hot summers, the increase of afforestation with resinous species, especially Pines and Spruce; defective cultivation methods, particularly insufficient clearings, in private Pine and Spruce plantations.

Practically forest pests are divided into two groups the *xylophaga*, or insects which eat the wood, and the *phyllophaga*, or insects which eat the leaves. The surest method of preventing the attacks of the former, (for instance, Scolytides, Curculionides, Cerambycides, etc), is to keep the tree in the best possible state of vegetation. The phyllophagous insects (*Melolonthideae*, *Curculionidae*, *Chrysomelideae*, *Tenthredinideae*, especially caterpillars) are not influenced by the health of the tree. The only way of controlling these leaf-eaters is by adopting the cheapest destructive methods.

Long experience has shown that a most efficacious preventive means against the harm caused by forest insects is the mixing of the species of trees. The broad-leaved trees must be mixed with Conifers, and various species of the latter should be grown in each forest.

The following insects have been the most harmful in French forests since 1900:

COLEOPTERA.

Buprestidae: *Coroebus bifasciatus; L. undatus* (Cork worm);
Melolonthidae: *Melolontha vulgaris;*
Meloïdea: *Lytta vescicatoria;*

Curculionidae: *Hylobius Abietis, Pissodes notatus, P. Picae, Orchestes Fagi.*

Scolytidae: *Tonicus (Ips) typographus, T. (Ips) chalcographus, T. curvidens, Chryphalus Piceae, Tomicus sexdentatus, T. bidens, Polygraphus polygraphus,, Myelophilus piniperda, Scolytus Geoffroyi, Xiloterus lineatus;*

Chrysomelidae: *Caleruca calmariensis.*

LEPIDOPTERA

Bombycidae: *Liparis dispar, L. chrisorrhacea, Bombyx neustria Cnethocampa processlonea, C. pytiocampa;*

Geometridae; *Hibernia defoliaria, Cheimatobia brumata, Eidonia piniaria, Booarmia crepuscularia;*

Tortricidae: *Tortrix viridana Retinia buoliana, R. turionana, R. resiretta, Frapholitha pinicolana;*

Tineidae: *Colephora laricella,*

HYMENOPTERA

Tenthredinideae: *Lophyrus Pini, Lydà pratensis.*

HEMIPTERA

Coccidae: *Lecanium Robiniarum, Aspidiotus Pini.*

The forests in Corsica, Algeria and Tunis are generally formed of mixed plantations and of native species which are well adapted to the climate; further, there is no rewooding in these countries. This does not mean that no damage is done here and there, but the evil is sporadic and not at all severe.

The most valuable tree in Algeria and Tunis is the Cork-oak (*Quercus Suber*). The leaves of this tree are very much damaged by the caterpillar of the *Liparis dispar* and the *L. chrysorrhaea,* which can easily be got rid of, however, by well known methods. A much more injurious enemy, and one for which a practical remedy has not yet been found, is the red-headed ant, *Cremastogaster scutellaris* Ol., which tunnels through the thickness of the cork layer on the tree in Tunis, and renders the cork useless.

The *Platypus cylindrus* is also very dangerous, and the mischief caused by it is increasing.

MYRON H. SWENK. **The Pine-Tip Moth** (*Retinia frustrana*, **Scudder) in Nebraska.** — *Forestry Quarterly*, Vol. VIII, N. 4, pp. 413-414. Cambridge (Boston) Mass. December 1910, **1071**

United States: Nebraska

The young pines growing in the National Forest at Halsey, Nebraska, have suffered severe injury through the ravages of *Retinia frustrana*, Scudder.

In July 1909 about 35 per cent. of the new tips were affected by this insect, and practically all of them were dead and brown. The trees most injured were in the older parts of the plantations where the Jack Pine was about 6 feet (1.83 metres) high with smaller Scotch Pine scattered among them.

During the year 1910 these injuries have spread to practically all the young pines in the forest and the injured twigs exceeded 50 per cent.

The insect is at least two-brooded in this locality; the injury by the first brood of larvae becoming manifest by the middle of June, at which time the larvae are approaching full size and the older ones are already going into the pupa condition. The pupal stage is of short duration and the moths commenced to emerge by June 28 and continued coming out for nearly a month. The majority of the moths had emerged by July 10. In late July and early August the tiny larvae of the second brood may be found working in the terminal buds, and, as this brood develops, the previons injury is duplicated.

The egg of the moth is small, flat, yellowish, and seems to be usually deposited near the extreme end of the young tips, so that the larvae on hatching, burrow immediately into the tender bud, and, as it develops, they form a cavity from 1 to 3 inches (25.4 to 76.2 millimetres) in length. When full grown, the insect pupates near the terminal end of the infested tip. This burrowing causes the death of the tip, and, as the needles rapidly turn brown and drop off, the injury becomes very conspicuous. In the National Forest the principal injury occurs on Jack Pine, but the Scotch Pine and Western Yellow Pine are also affected.

A considerable amount of parasitism is present among the tip-moths, a small, black Ichneumon fly and a Chalcis fly being the principal parasites. There is also evidence that an entomophagous fungus has been at work during 1910.

1072 L. BRUNER. **A Saw-fly Injurious to the Western Yellow Pine in Nebraska.** — *Forestry Quarterly*, Vol. VIII, No. 4, December 1910, pp. 411-413. Cambridge (Boston) Mass.

United States: Nebraska

A saw fly is doing considerable harm to the pines of north-western Nebraska and in the Black Hills region, the trees being nearly or completely defoliated by the larvae. Specimens of the insect have been collected at Custer, South Dakota, as well as in Dawes and Sioux Counties in Nebraska, and in the writer's opinion related forms or species have been found in both New Mexico and Old Mexico.

The insects sent to the U. S. National Museum for determination received the name *Lophyrus Townsendi*, the species being as yet donbtful.

It seems that this saw-fly has only a single generation in a year. While under study, it was seen to be largely attacked by several parasites. So far, two species of *Tachina* flies, one Bombycide and three Ichneumonids have been detected. One of the latter, probably a species of *Exenterus*, seems to be the chief and controlling parasite.

1073 MONGENOT. **The Leaf-Roller Caterpillar in the Jura Pine Forests** (La chenille tordeuse). — *Bulletin des séances de la Société nationale d'Agriculture de France.* N. 2, pp. 36-39, Paris, Jan. 1911.

France. Switzerland

The pine forests situated on the Eastern slopes and table-lands of the Jura, on both sides of the Franco-Swiss frontier, have been invaded since 1906 by two small Lepidoptera of the family of Leaf-rollers *Tortrix rufimitrana* and *Tortrix murinana.*

The extremities of the youngest shoots of the pine turned red in colour, as if the trees had been frost-bitten, this appearance was due to the caterpillar which, nibbling the leaves, caused them to dry up, turn red, and then fall. These two leaf-rollers are practically alike in appearance and mode of life. Mr. Mongenot gives the description in detail of the evolution of these insects, which appear to be monophagous.

The trees attacked do not die as a rule; the leaves of the preceding year, and those of the current year which have escaped the voracity of the caterpillars, continue growing, but a diminution in the thickness of the annual rings is observed, and a consequent slowness in the growth of the stems.

The control of the insect is very difficult; smoking the caterpillars has been tried, as well as destroying the chrysalides by raking and burning the covering of the soil, but these various processes have not given very satisfactory results.

There are several birds which destroy numbers of these insects, but the Ichneumonidae are the most formidable parasites of the pest and the most useful auxiliaries in its destruction. The invasion was stopped in 1909 thanks to the appearance of the Ichneumonidae and the stormy weather.

The havoc caused by the Tortrices should not be confused with that caused by the fungus *Phoma abietina*.

Coleophora laricella Hbn., **injurious to the Larch in Russia.** — See N. 987 in this Bulletin. 1074

Pineus Sibiricus (Chidk.) CB., **injurious to the Cedar in Russia.** — See N. 987 in this Bulletin. 1075

Other Animal Pests

E. E. GREEN. **Report on the Outbreak of *Achatina Fulica*: a Plague of Snails in Ceylon.** — *Circulars and Agricultural Journal of the Royal Botanic Gardens*, Ceylon, Vol. V, N. 7, pp. 55-64, Colombo, Aug. 1910. 1076

Ceylo

Several villages near Bernwala, Ceylon, complained of the damage caused by millions of giant edible snails which crawled over the ground, swarming over vegetable beds, climbed up walls, fences and poles and clustered on the tree-trunks.

The zone attacked was an area of 3 or 4 sq. miles, but the general aspect of the vegetation was luxuriant and healthy, owing to the fact that these gasteropods were largely engaged in scavenging work;

they were seen to feed upon excrement, thus doing a good service to public hygiene.

They did some harm to gardens and crops, however, because they attacked a large number of plants. They devoured the leaves and young plants of the *Hibiscus*, slightly attacked the foliage of *Colocasia*, *Alocasia* and *Discorea*, and stripped off the bark of the *Solanum melongena*, *Artocarpus integrifolia* and *Artocarpus incisa*, the flowers of *Carica Papaya*, the fruit of *Averroa* and the buds of *Musa paradisiaca*.

Among uncultivated plants, the *Laportea crenulata*, which has nearly disappeared from the infected zone may be mentioned.

The snail in question is *Achatina fulica*, which grows to a length of from 10 to 12 cm. (4 ½-5 inches), and is extraordinarily prolific. Among its few natural enemies are the pond tortoise, and a predacious ant, *Phidelogeton affinis*, which destroys a large quantity of eggs.

The loss of the crop for a whole year, the destruction of all the plants in the infected zone and the high price of the necessary labour make the extermination of the snails very impraticable. But it is advisable that the following measures should be adopted to prevent the spread of the pest:

1. Protection ditches or furrows; they do not constitute an insurmountable barrier against the snails, (unless they can be kept flooded) but hinder their free passage.
2. Charcoal and ashes spread round the plants act as deterrents.
3. Fruit-trees can be protected by tying bands of freshly tarred coco-nut fibre round the stems.

1077 **The Starling** (***Saturnus vulgaris***). — *Board of Agriculture and Fisheries.* Leaflet N. 45, pp. 1-4.

Great Britain

The Starling feeds principally on worms, snails, chafer larvae, beetles, wireworms, surface caterpillars, larvae of daddy long legs, and many other hamful insects, as well as pupae and eggs.

The starling is also useful on newly ploughed land, and in meadows and pastures.

On the other hand: this bird devours or spoils cherries, apples and pears, and other fruit to a less extent; whilst it is sometimes destructive to seed-wheat.

There is no doubt that starlings do much harm in English orchards when the fruit is ripening. On the whole, however, the information at present collected goes to show that in view of their partiality for insect food, starlings are, from the forest standpoint, very useful, whilst in agriculture and gardening their usefulness far more than outweighs the occasional harm done.

Legislation for the Protection of Plants

1078

Belgian Congo

Agricultural Service in the Belgian Congo. — (Le Rôle du Service de l'Agriculture au Congo Belge). — *Ministère des Colonies.* Vol. I, N. 2, pp. 145-167, (159-161), Bruxelles.

The Agricultural Service in the Belgian Congo is to supervise the plantations of the Colony by the following means :

1) *Sanitary supervision of the plantations.* The entomologists and mycologists attached to this Service attend to the study of cryptogamic diseases and pests likely to be harmful to the plantations and to live-stock. The reports of these specialists and the results of their investigations together with instructions for controlling the enemies of crops are distributed to the agricultural agents and to the planters by means of the *Bulletin Agricole.*

The Agricultural Service takes the necessary measures for checking the further spread of diseases and of harmful insects.

2) *Destruction of injurious Animals.* The Service will undertake the destruction of wild beasts, etc., when a source of danger to the herds and plantations in the cultivation and breeding centres, in the same way as this is done in neighbouring Colonies. For this purpose, it has the power to grant bounties for the destruction of these animals, and in urgent cases may organise battues or take any other means necessary.

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The information contained in some of the abstracts dealing with Canada has been most kindly placed at the disposal of the Institute by the Government of the Dominion.

The Canadian abstracting is by Mr. J. K. Doherty, the able chief of the Canadian Bureau of Correspondence with the International Institute of Agriculture.

AGRICULTURAL INTELLIGENCE

NB. The Intelligence contained in the present Bulletin has been taken exclusively from the books, periodicals, bulletins, and other publications which have reached the Library of the International Institute of Agriculture in Rome during the month of April 1911.

The Bureau assumes no responsibility with regard to the opinions and the results of experiments outlined in the Bulletin.

The Editor's notes are marked (Ed.).

Development of Agriculture in Different Countries. — Scientific Institutions. — Education in Agriculture and Forestry. — Experimentation. — Biography. — History of Agriculture.

MEKOYIÉ (Austrian Consul). **Agriculture in Montenegro.** — *Berichte der k.k. Oester.-Ung. Konsularämter,* Montenegro-Antivari, pp. 1-15 Wien, 1910. **1079**

Montenegro

In Montenegro there are extensive barren tracts. There are however productive regions where maize, wheat, barley and some rye are cultivated, but even in the best years not sufficient for local consumption. Few vegetables are grown. Potatoes are generally cultivated but might be made much more productive; in some years they have been exported to Dalmatia.

Montenegro produces excellent pears, apricots, cherries, almonds, lemons and figs, but in no great quantity. Wine is produced in abundance, but is not of good quality.

Great pains have been taken to stimulate the culture of olives, which prosper along the coast, between Antivari and Dulcigno. About 9000 quintals of olives are produced, and the surplus over home consumption is exported to Servia and Albania.

Tobacco culture has developed admirably since the monopoly was entrusted to an Italian administration. Turkish seed has been introduced, selected and improved under Italian supervision. The *Balcha, Danica* and *Nemanja* are excellent varieties, much appreciated abroad. The Italian Society has 520 hectares (1284.4 acres) under tobacco, with an average production of 750 kg. per hectare, (670 lbs per acre) bringing in annually about 3 500 000 frs. (£ 140 000) The exportation is chiefly to Dresden, and to France and Belgium.

The cattle are not remarkable; the horses are small and the oxen of inferior breeds. Much cheese is produced, and the butter is excellent. On the markets of Niksic and Podgoritza, from 5000 to 6000 sheep are sold; the entire exportation of sheep goes to Italy. In order to protect the forests, of which there are few, the breeding of goats has been limited; they are all exported to Italy. Poultry-rearing might be carried on successfully in the country; eggs are exported to Ragusa, in Dalmatia.

1080 VAN DEN STEEN (Belgian Consul). **Agriculture in Switzerland.** (La situation agricole suisse). — *Recueil Consulaire*, T. 152, 3e Livraison, pp. 110-332. Bruxelles, 1911.

Switzerland Switzerland is naturally adapted for cattle raising and sylviculture. Meadows and pastures together occupy 75 % of the total productive area, and arable land only 11.7 %. The cultivation of cereals occupies about 200 000 hectares (494 000 acres).

The production of potatoes has reached 8 400 000 quintals, grown chiefly in the Cantons of Berne, Fribourg and Vaud. About 20 000 quintals of sugar-beet are grown, and are all bought by the sugar-factory of Aarberg.

Tobacco is grown in the Cantons of Vaud and Fribourg, on about 400 hectares, producing annually about 12 000 quintals.

Vines cover a total of about 24 794 hectares (61 241.18 acres), but do not grow in the Cantons of Uri, Unterwald and Appenzell. The production of wine varies between 1 200 000 and 1 300 000 hectolitres. The most celebrated wines are: Dézaley de Lavaux, Yvorne (Vaud), Neuchâtel, Neftenbach, Hallau (Schaffhausen) and Goldwändler (Argau). With help from the Government, the vineyards destroyed by phylloxera have been reconstituted, but the surface under vines diminishes yearly.

Fruit is grown everywhere, especially in the Canton of Thurgau and in part of the Canton of Berne. The number of fruit trees is estimated at 14 millions and their annual produce at 60 million francs (£ 2 400 000). A great quantity of preserves are made at Lenzbourg, Rorschach, Saxon and Minusio.

In 1900 forests covered 29 % of the total area of Switzerland. In the Jura they cover from 31 % to 41 % of the productive soil. Their annual production is calculated at 40 million francs, (£ 1 600 000), and it is not enough for the home consumption.

Cattle-raising and the allied industries are closely connected with the growing of forage crops. Alpine pastures cover about

1 100 000 hectares (2 717 000 acres), and it is here that the strength and endurance and build of Swiss cattle are developed.

There are now about 1 ½ million head of cattle in Switzerland. Of these, two races have been brought to remarkable perfection:

1) The brown race, in the central region and the Grisons;

2) The white race with: *a*) yellow markings, (*Simmenthal*); *b*) black markings, (*Friburg*).

A Swiss cow is calculated to yield on an average 2650 litres of milk per year. Of the total production of milk in Switzerland, about 10 400 000 hectolitres are consumed fresh; 6 840 000 are used in cheese-making; 3 340 000 in the rearing industry; and 986 000 in the manufacture of condensed milk.

The following table shows, in millions of francs, the total production in all branches of the dairy industry in 1907 and 1908:

	1907	1908
Fresh milk	1 839	2 159
Fresh butter	92	47
Condensed milk	31 445	27 103
Cheese	54 183	54 128
Sugar of milk	13	1
Farine lactée	2 784	2 536
	90 356	85 974

The importation of dairy produce in 1909 was valued at 13 390 000 francs (£ 535 600). Condensed milk is made at Vevey, Payene, Neuenegg, Cham, and Guin; sterilised milk chiefly at Stalden (Emmenthal) and at Utzenstorf.

The native Swiss cattle are all bred for dairy purposes, cattle are imported for the meat market.

Since 1887 efforts have been made by the Government and by the Cantons to revive the breeding of horses, and several stud-farms have been established. There is but one Swiss breed of horses, that of the Franches-Montagnes, the centre for which is Saignelégier, in the Bernese Jura.

Efforts are also made to improve the breeds of pigs and to increase their numbers.

The white goats of Saanen, the goats of Oberhasli and of the Toggenburg are celebrated.

Sheep are only raised in the high pastures inaccessible to cows. Notwithstanding the encouragement given, poultry-raising makes little progress. Bee-keeping flourishes; there are about 250 000 hives. The silk-worm industry would do well in the Canton Ticino. The lakes and streams of Switzerland are generally full of fish.

One great factor in Swiss agricultural development is the high level of professional agricultural instruction (1).

1081 TAHY von TAHVAR (Austrian Consul). **Agriculture in the Province of Novi Bazar.** — *Berichte der k. k. Oester- Ung. Konsularämter*, pp. 1-19. Wien, 1910.

Ottoman Empire: Novi Bazar

In Novi Bazar and the neighbouring Albanian provinces agriculture is improving, but the wooden plough and other primitive implements are still used. Wheat, barley, rye and especially maize are grown, as well as beans, French beans, cabbages, potatoes and tomatos. Onions and cabbages are exported to Salonika. A good deal of fruit is grown, and walnuts, apples and plums are exported. Tobacco is grown for home consumption only.

Cattle-raising is one of the most important industries, but modern methods and modern forage plants are still unknown, and the cattle live in the open fields, and are put to work too young. The breeding of horses has deteriorated. The following are the figures for the exportation from Novi Bazar and the surrounding Albanian provinces in 1901:

Cereals	28 144	quintals
Fruit	2 534	»
Onions	5 787	»
Cattle	28 400	head
Hides	1 399	quintals
Cheese from ewe's milk . . .	2 467	»
Wood	42 642	»

The walnuts are sent to America and the apples to Rumania. Cattle are exported, via Salonika, to Egypt, Sicily and Malta. Besides hides of cattle the skins of sheep and goats, of foxes, wild cats, sables, badgers, wolves and bears are exported.

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(1) See No. 1102 of this *Bulletin*. (*Ed.*).

1082 ZAMBAUR (Austrian Consul). **Agriculture in Northern Albania.** — *Berichte der k. k. Oester- Ung. Konsularämter*, pp. 1-28, Wien, 1910.

Ottoman Empire: Albania

In Northern Albania, especially round Scutari, maize chiefly is cultivated and forms the common food. The production varies between 34 and 35 million kg. (74 800 000 lbs and 82 000 000 lbs), and sometimes a good deal is exported, principally to Montenegro. About 5 million kg. of wheat are produced and part is annually exported to Montenegro and Southern Albania. The total production of barley and oats is about 1 500 000 kg. (3 300 000 lbs) the barley is given to the army horses. In some years the production of hay is very great.

The tobacco is excellent and abundant, being free from all Government control.

Vines are not well managed and were ruined by cryptogamic diseases. But last year a yield of 10 000 000 kg. (22 000 000 lbs.) of grapes was obtained, and vine culture seems to be reviving.

Olive oil is produced, sumach is also grown.

There is a fair exportation of hides. Poultry-raising and the exportation of eggs are increasing.

There are fine forests, but the want of roads has rendered exploitation impossible hitherto, notwithstanding the efforts of some Italian contractors.

1083 **Agricultural and Irrigation Developments in Andalusia.** *The Times* (Engineering Supplement). No. 321. p. 21. London, April, 19, 1911.

Spain: Andalusia

The Province of Seville is one of the richest agricultural districts in Spain. In addition to cereals and all kinds of garden produce, oranges and olives are grown in large quantities, and the conditions of soil and climate are favourable for the cultivation of mulberries, for silk, tobacco, and cotton.

Yet large tracts of ground are barren, which might be fertile, and agricultural distress is chronic. The sole reason is want of water.

To remedy this state of things, a Committee of engineers was appointed by the Government to study the possibility of irrigation. Of the scheme proposed by the chief engineer and adopted by the Government, the most important part is the construction of a canal in ten sections, having a total length of 247 km. (167 miles), which will take the water of the Guadalquivir at Palma del Rio, and distribute it over a total area of 80 600 hectares (199 082 acres). To supplement the river water in dry seasons, when the stream is low, six reser voirs will be constructed in convenient valleys, with a total available capacity of about 260 000 000 cub. met. (340 600 000 cub. yds.). On the right bank five short canals will be made, having a total length of 93 km. (58.125 miles) each fed by its own reservoir. These reservoirs will have a total capacity of 81 000 000 c. m. (106 110 000 cub. yds.), and will together irrigate an area of about 40 sq. miles. The continuous supply of the whole system of six canals will be 33 087 litres (58 233.12 pints) a second. The total cost of the proected works is estimated at 40 500 000 pesetas. (£ 1 620 000).

1084 J. DAUTREMER (French Consul). **The Yangtse.** (La grande artère de la Chine, le Yangtseu), in-8°, pp. 295 + map. Paris. E. Guilmoto, ed.

China This book gives an account of the geography, ethnography, customs, religion, government, commerce, natural resources and industries of the basin of the Yangtse. It contains an historical summary of the commercial relations between China and Europe; an account of agriculture in the provinces of Kiangsu, Hupeh, Anhwei, Kiangsi, Hunan, Kwei Chau, Szechwan, and Yünnan; information on customs tarifs, postal service, corporations and secret societies in China, together with some account of Europeans and Japanese on the Yangtse Kiang.

The same crops, chiefly rice, are grown in all the provinces in the Yangtse basin, where the mass of the population is agricultural. The immense, well-watered plains are very fertile. In the provinces of the Upper Yangtse the mountain slopes are terraced, and the rice fields thus formed are irrigated from high reservoirs whence the water flows from field to field until it reaches the valley. Besides rice, maize is grown, sweet potatoes (1), earth-nuts, different sorts of haricot beans, melons, water-melons, Jerusalem artichokes, the water-chestnut (2), cabbages, turnips, carrots etc.

In these regions there are buffaloes, used for field work, zebus, sheep and ponies. Poultry do extremely well. Pig raising here, as all over China, is very common, as pork and rice are the staple foods in China. Hares, pheasants, and roebuck abound, but the Chinese do not touch game.

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(1) *Batatas edulis.* (*Ed.*).

(2) The kernel of *Trapa bispinosa*, Roxb. is a common article of food in the regions where it grows in India. It is rich in starch, and like the chestnut in flavour; it is eaten cooked or raw.

See WATT, *Dict. of the Economic Products of India*, vol. VII, part. IV, p. 73. London-Calcutta, 1893. (*Ed.*).

The Yangtse and its affluents are literally full of fish, which are found even in the ditches in the rice-fields, for the Chinese breed fish. In spring, sturgeons and shad go up the Yangtse, sturgeons as far as Hankow and Kieukiang; the shad only as far as Shanghai. Carp and eels are the commonest fish.

The richest provinces in this part of China are Kiangsu, Kiangsi, Anhwei and Szechwan; the provinces of Hupeh, Hunan, Kweichau and particularly Yünnan are poor.

The silk markets are at Shanghai and Canton. The finest silks come from Chêhkiang, Shantung, and Canton; those of Chêhkiang and Canton are from silk-worms fed on mulberry leaves; those of Shantung from silkworms fed on the leaves of a kind of oak, which give a brown colour to the silk (1). The Chinese judge silk by its whiteness, suppleness and fineness, and often, to give it a good appearance, they dress it with rice-water mixed with lime, with the result that when it arrives in Europe it constantly breaks in winding. The silk of Chêhkiang is prepared in the province of Kiangsu, specially at Nankin. There are many silk factories with European machinery at Shanghai and other towns.

The cultivation of the opium poppy is prohibited, by Imperial order, throughout the Empire, and since the agreement with Great Britain, the importation of Indian opium decreases gradually, so that in time it will be entirely suppressed (2).

Tea grows everywhere, but the best quality comes from the hills of the provinces of Hupeh, Kiangsi, Fukien and Chêh-kiang. cotton and ramie are grown in the Yangtse valley.

Hides of cattle, buffaloes and goats form an important export, the preparation of which is not without danger, as anthrax decimates cattle in the Yangtse valley.

In the province of Hupeh the principal products are: rice, of which in some parts there are two harvests in the year; wheat and cotton in the northern part, hemp, ramie, and sesame, tea, which is the chief product of the district of Ohe-nan-Fu; the lac tree (*Rhus vernicifera*) and rhubarb, in the mountainous western parts of the province; haricot beans, indigo, tobacco, sorghum, maize and millet.

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(1) *Antheraea yamamai*, Guér. Ménc. See remarks on *Antheraea* by Sir GEORGE WATT, *The Silk of India* (*Ibid.*, Vol. VI, Part. III, p. 69). (*Ed.*).

(2) In 1909, the importation of Opium into China was valued at £.4 654 295. *The Statesman's, Yearbook*, 1911, p. 699. (*Ed.*).

The potato, introduced by Italian missionaries, forms, together with the sweet potato, the staple food of the peasants in the mountains of the western part of this province. The centre of the silk-worm industry is Ta-Yang.

In the province of Hunan, rice is grown, especially in the plains round Lake Tong-Ting and in the Siang valley; cotton, in all the northern part of the province; tobacco, of superior quality but very strong in nicotine, especially in the district of Tcheng-Tcheou; indigo, and very superior tea. The annual exportation of black tea is worth from 20 to 25 million francs (£ 800 000 — £ 1 000 000); green tea is also grown in Hunan, and a little silk is produced.

Hunan and Yünnan are the only provinces in China where there are forests that are exploitable.

In the province of Kweichau ramie is largely cultivated. Horses and cattle are raised in considerable numbers.

The province of Szechwan exports pigs' bristles, musk (about 600 kg. (1320 lbs) annually), rhubarb, both wild and cultivated, white insect wax (1) (to the value of about 300 000 taëls annually), yellow wax, gall-nuts, and hides (2).

Great progress has been made of late years in sericulture. The provincial Bureau of Agriculture sells, on request, silkworm « seed » imported from Hang-chou, Soochou and Japan. This « seed » is distributed gratuitously in all the schools where sericulture is taught. Premiums are offered annually by the authorities for the production of silk of superior quality.

The province of Szechwan exports vegetable tallow, extracted from the seed of *Stillingia sebifera* (Euphorbiacea).

Chinese money and weights. — An Imperial Decree of May 24, 1910, prescribes that the unit of currency shall be the silver piastre and the standard shall be silver until further orders; subsidiary coins will be pieces of 50, of 25 and 10 cents (3) etc.

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(1) Called also Chinese Wax. It is produced by an insect parasite, *Ceroplastes ceriferos*, on the young branches of *Terminalia Arjuna*. WATT, *Dict. of the Economic Products of India*, Vol. V, p. 459. London-Calcutta, 1891.

(2) The haikwan, or customs täel was eqnal in value in 1909 to 31 ¼ *d* = 3.13 frcs. (*The Statesman's Year-Book*, 1911, p. 702 London, Macmillan, 1911. (*Ed.*).

(3) The cent is worth at present, at Hankow, 0.0375 fr. which would make the piastre worth 3.75 fr. See p. 12 of this *Bulletin*. (*Ed.*).

The units of weight are the following (1):

Chinese name	European name	Value in metrical weights	English weights
Tan	Picul	60 kg.	133 ⅓ lbs avoirdupois
Chin . . .	Catty	600 gr. $\left(\frac{1}{100}\right.$ of a tan$\left.\right)$	1 ⅓ lbs avoirdupois
Liang . .	Tael	37.5 » $\left(\frac{1}{16}\right.$ of a chin$\left.\right)$	1 ⅓ oz. avoirdupois
Chi'en . . .	Mace	3.75 » $\left(\frac{1}{10}\right.$ of a liang$\left.\right)$	
Fên . .	Candaren	0.375 » $\left(\frac{1}{10}\right.$ of a chien$\left.\right)$	
Li	Cash	0.0375 » $\left(\frac{1}{10}\right.$ of a fën$\left.\right)$	

The *meou*, (about 600 m^2) and the *king* (about 100 *meou*) are the principal surface measures. The *li*, common unit of length, varies from 500 to 650 metres between Northern and Southern China.

MAZZOLANI. **Agriculture in the Province of Yünnan.** (L'Agricultura nella provincia dell' Yünnan). — *Boll. Soc. Geografica italiana*, N. 4, pp. 476-504, Roma, Aprile, 1911. **1085**

China: Yünnan

The climate of Yünnan is partly tropical, partly temperate, and the soil is very varied. The chief crop is rice, of which the following are some of the varieties: *lo-mi*, *nan-mi*, *tong-iao-mi*, *he-lo-mi*, *siao-mi*, and *hong-mi*. The last, (red rice) is the most cultivated, because it resists the irregularity of the summer water supply. It is cultivated, not only in the valleys, but also on the terraced hill-sides. In some irrigated localities, two rice-crops are obtained in the year. Sometimes the rice fields are left fallow for 2 or 3 years.

Winter and summer-wheat are grown. The grain is small, and the flour makes good bread, but it does not rise much. Maize is grown on a large scale; the grain is small and whitish. Oats are also grown, and earthnuts, haricots, beans, pumpkins, potatoes, peas, carrots, celery etc. Foreign horticultural seeds give excellent produce of fine quality.

Cotton and hemp are not much grown, but tobacco cultivation is spreading everywhere. Tea is mostly of middling quality, but is very good in the district of Pueul. Bee-keeping is diminishing, because of the cultivation of the poppy, poisonous to bees. Sugar-cane grows everywhere. Medicinal plants are numerous. Musk is sold for 6 or 7 times its weight in silver. The mountains are wooded with pines, firs, oaks, ilex etc.

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(1) The English equivalents of Chinese weights are those established by treaty between Great Britain and China. The *Chih* of 14 1/10 English inches has been adopted as the legal standard of length. *The Statesman's Yearbook for 1911*, p. 703. (*Ed.*).

Horses are numerous; they are small but strong and enduring. The mules are excellent and larger than the horses. Donkeys are not much used. The cattle are small, except in the neighbourhood of Linngan; they are yoked with buffaloes in the rice-fields, and also serve as beasts of burden. The cows do not give much milk; goats are numerous; and sheep very fine, of good quality and not very large. Pigs are raised in great numbers; their meat is not firm when from breeds in the plains, but in the mountains the pork is considered the best in all the Empire.

Ducks, geese, pigeons, and fowls are reared; our common fowl is even found wild in Yünnan.

1086 **Agriculture in Japan.** *The Producer's Review, Perth,* Western Australia. March, 20, 1911.

Japan The Department of Agriculture in Tokyo has published a work of 132 pages entitled « Outlines of Agriculture in Japan ». It states that of a total population of 51 000 000, about 31 000 000 or 60 per cent are engaged in, or dependent upon agriculture. The farms are generally small. Anyone who possesses more than 75 acres of land is regarded as a large landed proprietor; an ordinary land-owner's estate does not exceed 25 acres. Tenants' rents are by no means low, the rent ranging from 44 per cent to 37 per cent of the gross products of the farm. Were it not for the fact that crops are raised twice, thrice and even four times a year, tenants would fail. Their farms vary in size from 1.96 acres to 3.68 acres, on which they support a household consisting sometimes of six members. To some extent they have to rely on subsidiary occupations, such as making mats, baskets, paper and bamboo articles, such work being done at night Seventy per cent of the farmers cultivate less than 2 acres and only 3 per cent cultivate more than 7 acres. Rice of course is the principal crop; then come the following products, given in order of importance: barley and wheat, raw silk, vegetables and fruits, beans, sweet potatoes, and animal products.

An interesting chapter on Agricultural administration shows that the Japanese Government are alive to the advantages of educating and assisting the farmers. Cooperation amongst farmers is encouraged and financial assistance is given in the holding of farms and in the sale of produce. Stringent measures are taken for the prevention of disease in animals, and for the destruction of insect and fungus pests, an army of inspectors being appointed to see that effect is given to legislation. It is pointed out that the future of agriculture in Japan is highly promising and that at an early date the import of cereals will no longer be necessary.

HOMERY. **Agriculture in Newfoundland.** (L'agriculture à Terre-Neuve). — *Rapports commerciaux: Terre-Neuve,* N. 940, pp. 1-22. Paris, 1911. **1087**

Newfoundland

Forest industry has developed very remarkably in Newfoundland. The manufacture of paper from wood pulp, which was begun only a few years ago, progresses very rapidly. The factories at Grand Falls cover an immense area of land and forest in the midst of which rises a whole town.

The soil is not fertile, but the Government makes every effort to improve agriculture, by distributing good seed, bringing over agricultural instructors, and forming agricultural societies. It is now hoped that the prosperity of the island will no longer depend entirely on the fishing industry (1).

G. MURRAY. **Agriculture in S. Vincent, W. I.** *Brit. Colonial Reports-Annual,* N. 668, St. Vincent - Report for 1909-1910, pp. 1-26, February 1911. London. **1088**

Windward Isles: St. Vincent

Owing to the comparatively low prices received for cotton in 1908 the area under this crop in 1909 was reduced. According to a rough estimate, prepared by the Cotton Inspector, in the early part of 1910 not more than 2000 acres were put under cotton as compared with an estimated area of nearly 3000 acres in 1908. The area in which cotton can be cultivated is limited, practically, to the coast lands. Every effort is being made by the Agricultural Department to induce planters and small growers to devote more attention to the burning of old cotton stalks, and to crop rotations; they are also urged to grow more leguminous plants for green-manuring and to utilise all available manures, such as bushes, grasses etc. and cotton seed. It is satisfactory to note the annual improvement in cultivation and the evident desire on the part of the growers to assimilate all the scientific and expert information given by the Agric. Department.

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(1) Compare with:

Forestry in Newfoundland and Labrador. Journ. of the Roy. Society of Arts. London. N. 2994, 1910.

ED. MORRIS. *What the railroads are doing to open up Newfoundland.* The American Review of Reviews, July 1910, p. 51. (*Ed.*).

In the St. Vincent Grenadines, notably in Union, Canonan and Mayrean, the common Marie Galante type of cotton is grown. It is cultivated as a perennial. In several of the other islets, Requia, Mustique, Battowia, and Balliceaux, the cultivation of Sea Island cotton has been taken up exclusively, and with very satisfactory results.

Arrowroot again heads the list in regard to area under cultivation, and also in regard to export value, which showed an increase of 100 000 francs (£ 4 000) over 1908. The « St. Vincent Arrowroot Growers' and Exporters' Association has been formed, with headquarters in Kingstown, for the promotion and encouragement of the arrowroot industry.

The export figures in sugar show an increase of about £ 1633. Most of the sugar grown is on the Canib estates. Elsewhere in the Colony it is only cultivated in small quantities for the purpose of making rum. The soil and climate of St. Vincent are no doubt as suitable for the growth of sugar as any other of the West Indian Islands. The cultivation of the cacao tree has never been taken up very heartily since the hurricane of 1908, when a large number of trees were destroyed.

The efforts to demonstrate the working of implemental tillage have been so successful, that planters are now systematically importing and using agricultural implements.

1089 VINCART. (Belgian Consul at Caracas) **Agriculture in Venezuela.** (Le développement agricole au Vénézuéla). — *Recueil Consulaire,* T. 152, 5e Livr. pp. 356-396. Bruxelles, 1911.

Venezuela Venezüela comprises three distinct regions, the coasts, the mountains, and the plains, each with its own climate. There are lands at different altitudes suited to every culture, from wheat to spices. Agriculture is still old-fashioned and limited to the growing, for exportation, of coffee and cacao. The land suitable for agriculture covers about 350 000 square kilometres, and the great *llanos* of the interior, where cattle-raising is carried on, cover about 400 000 square kilometres.

Venezuela has great natural resources. Cacao flourishes in the warm regions near the sea and coffee in the temperate regions up to an altitude of 1600 metres. Sugar-cane is also grown, and tobacco, maize, wheat, cotton, bananas, and a great variety of tropical fruits.

The value of the cacao and coffee exported in 1909-1910 was 54 ½ million francs (£ 2 180 000); of the India-rubber from the Orenoco forests, 14 millions (£ 560 000), and of the cattle hides, 8 millions (£ 320 000); these are the four great staples of Venezuelan exportation.

Maize is grown on a large scale, the grain serving for the *arrepas* or maize bread; cut green it forms the principal forage of the horses, mules and donkeys. Wheat is grown on the temperate slopes of the Andes, and yields a fine quality of flour rich in gluten. Sugar-cane succeeds almost every where on sufficiently moist or irrigated land. The varieties most cultivated are the native *Criolla*, *Salangore*, *Otahiti* and *Batavia*, this last especially for making rum. Distilling rum and spirits are important industries.

Tobacco does well, but is grown without much care. The cultivation of cotton has begun to develop lately, and that of ramie has been introduced round Valencia.

Bananas are being more extensively grown and might become a very important export. A North-American Company has bought land near Lake Maracaïbo for the purpose of growing bananas.

Next to the Argentine Republic, Venezuela possesses the widest extent of grazing lands in South America. Cattle-raising was once more prosperous than it is now. A British Company has however been formed for cold-storage of meat, and at Barrancas, on the Orenoco, a factory has been opened for the preparation of meat-extracts. Cattle hides are a sufficiently important export.

The immense forests on the Orenoco contain every sort of fine woods for cabinet-making, medicinal and tan-producing plants, and trees and lianas from which rubber can be extracted. At present they furnish mahogany, cedar, ebony, and guayacum. The balsam and the wood of the copahu tree, kola nuts, cinchona bark, Tonquin beans, or Sarrapia, are also exported.

The most important forest products are India rubber, of which, in 1909-1910, 32 700 kg. (71 940 lbs) were exported; and balata gum (1), of which 1 996 000 kg. (4 391 200 lbs.) were exported. For tanning purposes dividivi is exported and a small quantity of mangrove bark.

1090 YVES HENRY. **Agriculture in the Mono Region, Dahomey.** — (Etude économique de la région du Mono, Dahomey). *L'Agriculture pratique des pays chauds*, 11e année, N. 96, pp. 194-205. Paris, mars, 1911.

French West Africa: Dahomey

This region, lying between the rivers Mono and Cuffo and Lake Ahémé, has been studied to ascertain whether its agricultural possibilities and present modes of transport would justify the construction of a railway. The present elements of traffic are the annual crops, of maize, earth-nuts and manioc, and the products of the oil-palm. The region forms part of two river basins and is subject to periodical inundations. The soils suitable for cultivation belong to three different formations, of varying value:

1) The soil «de barre» a superficial formation, forms the greater part of the cultivated land. In the Sahué country it varies very much in value; and while in the western and southern parts of the plateau the soil is excellent, in the east it is unfertile. On the Locossa Parahué it seems more homogeneous and more fertile, and is light, permeable, and often rich in humus.

2) Alluvial soils deposited by the Mono in its immediate neighbourhood. These recent deposits are inundated during part of the year and form very deep sandy and organic loam, of great fertility.

3) Plastic clay, covering the greater part of the depression, which forms, to the north of the Sahué plateau, an immense marsh in the rainy season.

The total extent of soil fit for cultivation is calculated at 75 000 (185 250 acres) hectares, of which 50 000 (123 500 acres) may be classed as fertile, and very fertile; and 25 000 hectares (61 750 acres) as average and middling.

Palms cover about 13 000 ha. (32 110 acres) growing in thick plantations, generally connected with villages, especially in the Athiémé Locossa region. The fertile alluvial soils are particularly adapted to the oil-palm.

The population, in this region of the Mono, is calculated to be about 50 000.

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(1) *Balata:* rubber produced by *Mimusops*, a genus of Sapotaceae.

The principal exports from Venezuela in 1909 had the following values in *bolivars* (1 bolivar is approximately equal to 1 franc): Coffee, 39 736 538 bolivars; Cocoa, 18 073 477; Balata and Rubber 8 468 280; Hides, 7 148 430; Cattle 1 160 367 bolivars. *The Statesman's Yearbook, 1911*, p. 1323. (*Ed.*).

The production of maize that might be exported may be calculated at 15 000 tons approximately ; there might be also an important traffic in yams and manioc, but no precise data exist as to probable quantities. Taking the 13 000 hectares under palm trees as a guide, the palm kernels may be calculated at 10 500 tons, and the oil at 3 500 tons. The principal traffic would thus be :

	15 000	tons of maize,
	10 500	» palm-kernels.
	3 500	» palm-oil.
Total	29 000	tons.

The actual traffic amounts to 5000 tons, only about a sixth of the possible production. The Mono is an intermittent river, only utilisable for transport during floods ; bought produce has therefore to be stored, with consequent loss of time and money. The industry and commerce of this fertile region are thus completely paralysed by the deficiency of roads and means of communication.

P. DUSSERT. **Agriculture in Mayotte and the Comoro Islands.** (L'Agriculture à Mayotte et aux Comores). — *L'Agriculture pratique des pays chauds*, 11e année, N. 96, pp. 206-214. Paris, Mars 1911. **1091**

Mayotte and Comoro Islands

The Comoro Islands and Mayotte cover about 260 000 hectares. (642 200 acres) These islands are in the early stage of colonisation, when a harmonious and profitable relation has still to be established between colonists and natives. Sugar, vanilla, perfume plants, fibre plants, tobacco, oil-producing plants, and India rubber are all grown, and should in time make these islands a prosperous colony.

Mr. Dussert gives the exportation figures for Mayotte, from 1903 to 1908, which show that from 21 to 27 thousand kg. (46 000 lbs to 59 000 lbs) of vanilla are regularly exported, and sugar, coffee, rum and cacao in smaller quantities. In 1908,6 755 litres (11 888.8 pints) of perfume essences were exported, and 59 275 litres (104 324 pints) of rum.

Anjouan also possesses the necessary elements for prosperous agriculture ; provided that energetic measures be taken against deforestation, and that no pretext be given to the natives to emigrate. Coffee and cloves might be grown with profit. In 1908, 2 691 kg. (5 920 lbs) of vanilla and 262 596 kg. (577 711 lbs) of sugar were exported (1).

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(1) The island of Anjouan possesses numerous wild varieties of the genus *Citrus* See 855 of this *Bulletin*, March, 1911.

The little island of Moheli has soil like that of Mayotte, but is gradually being ruined by deforestation. It exported in 1908 11 360 kg. (24 992 lbs) of vanilla, 94 200 cocoa-nuts, 28 250 kg. (62 150 lbs) of manioc, etc.

Grand Comore has an area of about 105 000 hectares (259 350 acres), of which 35 000 (86 450 acres) are covered by recent lava streams from the crater of Kartala, where only scanty grass grows here and there. Forests cover 19 000 hectares (46 930 acres). A mountainous region of extinct volcanoes covers 25 000 hectares (61 750 acres) in the north and 2 000 hectares (4 940 acres) in the extreme south. The really fertile land lies along the coast and is from 2 to 5 kilometres (1.25 to 3.125 miles) wide. This belt covers about 40 000 hectares (98 800 acres), half of which are included in the lava streams above mentioned. In the east and south-east the soil is remarkably fertile. The flora of this island is rich in Rubiaceae; the coffee of the Comoro Islands is *Coffea Humblotiana*, in which there is no caffeine. The wild vine abounds in the forests, and nearer the coast wild cotton is found.

The forests have considerable influence on the climate; twice as much rain falls on the wooded mountain mass of Kartala as falls on the grassy slopes of the mountains in the north. The soil of the northern coast belt is too light for cereals, but the sugar-cane does very well there and sago-palm abounds.

Notwithstanding its "golden belt" of fertile soil, its 60 000 inhabitants, and its very healthy climate, Grand Comore, owing to the idleness of the natives, does not rise above a certain economic mediocrity. In 1908, 293 785 kg. (646 327 lbs) of physic nuts (1) and 50 100 coco nuts were exported.

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(1) The physic nut is the seed of *Jatropha Curcas*, L. (French: *Médicinier de Barbades* or *Gros pignon d'Inde*) an Euphorbiaceous shrub of 1 to 2 metres in height, which grows in South America, India, and on the west coast of Africa. These seeds yield a fixed oil, with the same medicinal properties as the croton, though less pronounced. Great quantities are imported into Europe for soap-manufacture and lighting purposes.

See DUJARDIN-BEAUMETZ et EGASSE, *Les Plantes Médicinales*. Paris, 1889 p. 384.

Arnaudon and Ubaldini found 37 % of oil in physic-nuts containing 72 % of water.

In India, *Jatropha Curcas* in grown especially on the Coromandel Coast and in Travancore. Besides its medicinal uses the oil of the seeds is said to be used especially in the manufacture of certain transparent soaps, for dressing woollen cloths and as a good drying oil.

The leaves of *Jatropha Curcas* appear to be sometimes used in Assam to feed eri silk-worms when *Ricinus* leaves are scarce. GEO. WATT, *Dict of the Economic Products of India*, London, 1890, vol. IV. p. 545. (*Ed.*).

RUSSELL. **The Development of Agriculture in Uganda.** *Brit. Colonial Reports Annual*, No. 670; Uganda Report for 1909-1910, pp. 1-42. London. February, 1911. **1092**

Uganda

The agricultural export trade from Uganda is increasing, especially that of cotton, hides, and rubber. The trade in chillies revived considerably during the year, and the export of ground nuts, ghee (clarified butter) and sesame seed was the highest ever known. The export of rubber, hides and goat skins was also the highest on record. The total quantity of rubber exported was 47 tons. The rubber is chiefly obtained from the West African rubber tree (*Funtumia elastica*). Amongst new articles of export which appear for the first time are bees-wax, cotton seed oil, and sesame oil.

The total number of plants distributed by the Botanical Department during 1910 was 160 679, being 102 217 in excess of last year's distribution. The demand for Para rubber and cacao seeds from trees in the Botanic Gardens greatly exceeded the supply. Large numbers of seeds, principally of Para rubber, were imported direct by planters.

The Para rubber trees grow well and more quickly than Funtumia trees. The Castilloa rubber tree grows well, but it is subject to the attacks of a weevil (*Inesida leprosa* Tal.). *Manihot Glaziowii* grows very rapidly. Two new varieties, *Manihot dichotoma* and *Manihot pianhyensis* have been introduced: the former has made exceedingly rapid growth, and a few trees will be already productive in another year. The sisal fibre of Uganda is of excellent quality and readily saleable. The cultivation of *Mazzaqua* Maize has been a failure. It promises best in the two districts where a further experiment is to be carried out. The bees-wax industry promises to be a success, especially in the Masindi district.

Three assistant superintendents who have had experience in cotton-growing in Egypt, the United States and Ceylon were appointed to the Cotton Department. In 1908,56 tons of cotton seed were distributed by the Government, 35 tons of which were *Black Battler*, the rest was *Upland* seed. Variety, cultural and manurial tests have been commenced in selected plots throughout the Protectorate, but these tests are not sufficiently advanced to permit any definite statement of results.

Another important branch of the work now being carried on is the visiting of the various districts by the officers of the Cotton Department for the purpose of giving practical demonstrations to native growers. The rapidly increasing desire on the part of the natives to cultivate cotton shows that the work which is being done in this direction is already bearing fruit. In the year 1904-05 the export of cotton amounted to 10 tons; in 1909-10 it was 2116 tons.

1093 F. MAIN. **Sanitary Regulations for Rice-Culture.** (La réglementation des rizières et l'état sanitaire dans les pays de riziculture). — *Journ. d'Agriculture tropicale*, No. 117, pp. 71-73. Paris, 31 mars, 1911.

Spain. Italy.

After rapidly reviewing Spanish and Italian legislation for the protection of farmers and work-people exposed to fevers by the stagnation of water in rice fields, Mr. Main observes that this question will not be solved by hampering rice-growing, but by making rice fields healthy. He recalls the important communication of Professor Golgi at the Congress for Rice-culture at Pavia in 1906, and the many publications on the subject in the last years, especially in the United States. Prof. Golgi observes that malaria diminishes in rice-growing countries with the progress of sanitation and improved methods of culture, consisting principally in the substitution of running for stagnant water. When this is secured through better agricultural instruction and by the cooperation of irrigation companies and a public water supply, there need be no appeal to Boards of Health for protection against rice fields.

1094 **Paris Bureau for the Study of India Rubber.** (Création d'un service d'études du caoutchouc à Paris). — *Bulletin de l'Office Coloniale*, No. 40, pp. 119-121. Melun, avril, 1911.

International Service: Paris

The International Bureau of the Scientific and International Association for Colonial and Tropical Agriculture, in connection with the Colonial Office and Colonial Garden of Paris, has organised a service for the investigation of all questions connected with India-rubber. This service is divided into two Sections, the one for scientific and industrial investigation, the other for bibliographical documentation and for economic and cultural studies. The latter section besides collecting all documents and papers connected with rubber, also acts as an Intelligence Office for giving information to the public.

Butter-Control during 1910 in Holland. (Les stations de contrôle des beurres en 1910). — *Laiterie et Elevage*, 6e année, N. 8, p. 62. Louvain, avril, 1911. **1095**

Netherlands

By the 31st. December, 1910, the total number of producers connected with the Stations for butter-control in the Netherlands was 880; the annual production of controlled butter is 43 405 000 kg. *i. e.* Assen, 3 900 000 kg.; Deventer, 10 512 400 kg.; Eindhoven, 5 150 000 kg.; the Hague; 3 500 000 kg.; Groningen, 2 000 000 kg.; Leenwarden, 14 333 600 kg.; Maestricht, 3 834 000 kg. and Middelburg, 155 000 kg, (1).

Union of the Agricultural Experiment Stations in Austria. (Gründung eines Verbandes der landw. Versuchsstationem in Oesterreich. — *Zeitschrift für das landw. Versuchswesen*, XIII, J. H. 9, pp. 755-757, H. 12, pp. 943-949; pp. 950-956. Wien, September, Dezember 1910. **1096**

Austria

The German Agricultural Experiment Stations have long formed a Union for the better organising of their work; hitherto no such Union existed in Austria. It was suggested in 1897, but the institution of the Zeitschrift or Review of Agricultural Experimentation in Austria was the only result. In December 1910, fresh efforts were made, and the Union of the Austrian Experiment Stations was founded, with the following objects:

1. The laying down of rules for sampling and for analytical investigations.
2. The undertaking and carrying out of experiments, enquiries and other technical researches, according to one common plan.
3. Combating proceedings considered unfair or otherwise prejudicial to agriculture.
4. Exchange of ideas among the Agricultural Exp. Stations.

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(1) The well organised butter control in the Netherlands, by favouring the production of butter of good and uniform quality, must contribute to the growing exportation of Dutch butter. The exportation of butter from the Netherlands in 1907 was valued at 29 397 000 guilders, and in 1908 at 33 072 000 guilders. (12 guilders = 1 £.; 1 kg. = 2.204 lb). The value of the butter exportation from the Netherlands is about double that of cheese exports. *The Statesman's Yearbook* for 1910, p. 1039. (*Ed.*).

5. The institution of umpires for settling questions of analysis and other professional differences.

For the furtherance of these objects the following methods have been adopted:

1. Periodical meetings for the discussion of questions interesting the Union.

2. The editing and encouraging of publications.

3. A closer connection with land-owners, farmers and other persons interested in agriculture.

It has also been decided to publish monthly, in the official Review of the Union, reports on the more important observations of members, to be communicated to the agricultural press. The data will be furnished: by Dr Czavek for forage, by Dr Piez for fertilizers; by Dr Kornrauth for vegetable pathology and harmful insects and for methods of control; and by the Vienna Seed-Control Station for seeds.

By the end of 1910, 17 Stations were included in the Austrian Union, with a total of 73 members. Under the title, *Mitteilungen des Verbandes der landwirtschaftlichen Versuchsstationen in Oesterreich* it has already published (January and February 1911) reports on Bernard Phosphate, « Phosphatose » (a French precipitated phosphate for cattle), an adulterated sulphate of ammonia, and the forage called « Z. Futter ».

1097 M.P. Papageorgiou. **Hellenic Royal Society of Agriculture** — (La Société Royale d'Agriculture Hellénique). — *Annales de Gembloux*, p. 89. Bruxelles, 1er févr. 1911.

Greece Agriculture is the principal source of prosperity in Greece, and presents a great variety of products: raisins, wine, silk, olives, oil, honey, cereals, tobacco, cotton, sesame and other industrial cultures. Fruits are in great variety: citrus fruits, grapes, figs, almonds, walnuts, chestnuts, pistachio nuts etc. Mules, horses, donkeys, cattle, pigs sheep and goats are raised and there is some production of cheese and butter. Bees are kept. But all these cultures and industries are little developed, and require improvement and financial impulse.

With a view to developing and improving the agriculture of the country, George I, King of the Hellenes, founded the *Royal Agricultural Society* in 1901.

An Administrative Council, composed of 36 members, chiefly country land-owners and men with scientific, agricultural and industrial knowledge, form the active nucleus of the Society.

Generous donors at once came forward and the Government gives annual subsidies,so that the Society is now in a position to render real service to the agriculture of the country.

The Society has at present three Agricultural Stations; at Khalandry, near Athens; at Aigion, in the Peloponnesus, near Patras; and at Pharsala, in the centre of the vast grain-growing plains of Thessaly.

The Station at Khalandry is chiefly for arboriculture; several thousand fruit trees, mulberry trees for sericulture, etc. are distributed yearly in all the provinces of the kingdom. A great variety of trees are collected and studied at this Station. A special department for sericulture, and for silkworm rearing is annexed to this Station.

The Station at Aigion is also arboricultural, with some specialisation for citrus fruits, and for improving the culture of raisin grapes.

The Station at Pharsala is of recent institution. Its special province is the culture of cereals, tobacco etc. It attends to the breeding of an early wheat, resistant to drought and to the scorching west wind, called *Livas*, from which crops often suffer.

These Stations study the acclimatisation of new economic plants, such as *Chloris Gayana* (a forage plant for dry regions) (1), the *Caravonica* cotton plant, and Egyptian and American varieties of cotton; varieties of barley for malt, etc.

The Hellenic Agricultural Society has also annexed to these Agricultural Stations stud stations where are kept pure-bred Arab stallions, donkeys from Cyprus for mule-breeding, of special importance to the country, Yorkshire and Berkshire boars, rams from the islands of Chios, Skopelos and Zante, Maltese and Angora rams. Some of the stallions are sent at the covering season round the districts where horses are bred. Stud books are kept.

Honey is an important product in Greece; and the Society opened a School of Bee-keeping in 1901, at Khalandry, under the direction of W.G. Toufexis. This school has given an important impulse to the industry, and already a great number of frame-hives, are in use. The Khalandry school has succeeded in organising agricultural statistics in the country.

In its offices at Athens the Society has organised: 1. a Service for Agricultural Information on all agricultural questions: Field work, stock-breeding, arboriculture, sericulture, olive oil production, vine-culture and wine-making, bee-keeping, raisin production, determination of crop diseases and methods for prevention and control, land-reclamation, etc.

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(1) On experiments with *Chloris Gayana,* see this Bulletin Nov. 1910. p. 58. and Febr. 1911, n. 446.

2. A Service of Agricultural Statistics, collected with the cooperation of the mayors, teachers, agriculturists, etc. This service is becoming gradually more important, as hitherto the agricultural statistics were very defective.

3. A permanent Exhibition of agricultural implements and produce. Through the Society agricultural machines and implements and seed may be obtained at a reduction.

4. The Society issues a Bulletin and occasional leaflets.

Annual Agricultural Shows, are organised, such as the Cheese Show last October, which has given an impulse towards improvement in cheese making.

Direct encouragement is given to all kinds of agricultural institutions, and the Society has instituted Committees for propaganda in the different parts of Greece.

Finally, the Society takes up questions of general agricultural utility and by presenting reports to Government helps to forward the interests of agriculture.

1098 P. J. BROUNOV. **The Russian Bureau of Agricultural Meteorology. Meteorological Critical Periods and Crop-growing. Agricultural Forecasting.** (Kratkii Otcerk Dieiatelnosti Meteorologhitceskago Biuro sa Vremia Ego Sutstcestvovaniéa). — S. Peterburg, 1910.

Russia

The Russian Bureau of Agricultural Meteorology began its work, in 1896, by organising, at the national exhibition of Nixegorod, a section for agricultural meteorology. A number of diagrams and data were here brought together on the relation existing between meteorological factors and the life of cultivated plants.

The study of this material showed the existence, for each plant, of a " critical period, " which varies according to climate, soil, methods of culture, etc.; and on the presence of a particular group of meteorological factors during this critical period depends the success or failure of the crop. For instance: for the most important meteorological factor, *rain*, the critical period for wheat and rye is immediately after sowing; for buckwheat, during flowering. Hence the utility of determining exactly this period in different parts of Russia, in order to regulate the choice of early or late varieties, of fertilisers (for instance, potassium nitrate hastens ripening), of time for sowing, etc., enabling the farmer to make the critical period coincide with the time of year most favourable to the life of the plant.

The answers, filled in by private persons, to sets of questions put by the Meteorological Bureau furnished too few and too uncertain data for so complex an undertaking. M. Brounov therefore, in 1907, organised a network of meteorological Agricultural Stations throughout the Empire. In these Stations the action of meteorological factors on the soil, on the growth of cultivated plants and on the life of domestic animals is studied.

In each Station an uninterrupted series of observations is carried out: on the modes of growth of cultures in the experimental field; on the moisture of the soil and of the atmosphere; on actinometry, evaporation, rainfall, penetration of frost in the soil, etc.

In 1904 the Bureau began to arrange the material supplied by the Stations, and in 1908 published a first work: "The action of meteorological factors on the growth of oats in the Tchernoziom, or "black soils," the more important conclusions in which are here summarised;

1. The "critical period" for oats, in relation to rain, comes on all black soils at the moment immediately preceding the appearance of the inflorescence.

2. During the first period of vegetation, cold does not hurt the crop; indeed, by prolonging the period of vegetation, cold strengthens the plant and raises the yield.

3. Frosts, and cold in general, do no harm during the first period, but become dangerous after the appearance of the shoots; the later they occur, the greater the danger. When the stools are already formed, a fall of temperature to —5° C is always fatal.

4. Observations on soil moisture are a good guide, better than rainfall observations, in regard to crop forecasts. If the soil moisture falls below 10 to 14 % before the appearance of the inflorescence the effect is always harmful.

5. The conditions of climate, and therefore the growth of oats, are not uniform all over the black-soil region, which from this point of view may be divided into an eastern and a western zone.

6. In the western zone, the abundant June rains are very favourable to the growth of oats; but the farther towards the east the more uncertain becomes the forecast for this crop.

Wheat, rye, millet and maize have been studied from the same point of view.

Not only on plants but also on domestic animals atmospheric changes have an influence. "The action of meteorological factors on the composition of cows' milk in Siberia" has been studied by M. Jefremov; he found by numerous methodical observations that thunder storms in summer and tempests in winter reduce the fat-content of milk by 0.2 to 1 %.

The critical period is determined by calculating the average value of constant factors; and these averages must serve as a guide in choice of varieties and of methods of culture best suited to given conditions. Weather forecasts determined by these data may be valuable to the farmer, enabling him to hasten or delay operations, and to protect his crops against foreseen dangers.

A method of forecasts has gained ground in Russia, based upon observations on the colours of the sky at twilight and at dawn, the forms of the clouds, etc. The Bureau has published some interesting notes on this subject: *Weather forecasts according to the colours of the atmosphere.*

The Bureau has also published numerous studies on the action of climate on soil, according to which Russia has been divided into geographico-agricultural zones. An atlas of agricultural meteorology has been published, besides many papers on the character and causes of meteorological phenomena that are harmful to agriculture. These papers, drawn up in clear language and distributed among the rural population, enable them to be on their guard against frosts, black fogs and other meteorological dangers.

1099 F. CHARLAN. **Experimental Stations for the Growing of Tobacco in Canada.** — *Department of Agriculture, Ottawa, Canada. Tobacco Division Bulletin.* N. A-9, Ottawa, Ont., April, 1910.

Canada: Quebec Ontario

Considering the rapid growth of tobacco culture in Canada within the last few years, and the good prospects for the Canadian product, which will henceforth be admitted in the manufactures of the Dominion on equal footing with its foreign competitors, the Dominion Minister of Agriculture established in 1909 experimental tobacco growing stations in the chief districts where this industry is carried on. Their object is to study how tobacco culture can be made more profitable in Canada; to demonstrate the value of proper methods; to create improved strains, and produce seeds, for general distribution in Canada; and to test new foreign varieties.

There are now three experimental stations. Two are in the province of Quebec, one at St. Jacques l'Achigan (county of Montcalm) the other at St. Césaire (county of Rouville). They cover about ten acres each. The third is in the province of Ontario, about a mile from Harrow (county of Essex); it covers an area of about twenty-seven acres.

These stations are placed in the centre of the different tobacco-growing districts, each under different climatic conditions. At the present time Quebec produces chiefly pipe tobaccos, of the « seed leaf », type, while Ontario grows pipe and chewing tobaccos of the « Burley » type. Experiments with Virginia tobacco have been carried on in the county of Essex during the last few years and special attention was given to this variety at the Harrow Station. A three-years rotation, comprising tobacco, grain, and clover, has been started to restore the fertility of these lands long considered as inexhaustible. Special attention was given to better aeration of the seed-beds. Experiments showed that good results may be obtained from the combined use of farm manure and commercial fertilizers. A new variety has been introduced, which will be pretty generally grown in the province of Quebec as soon as the quantity of seed harvested is sufficient for general distribution. The Hybrid Comstock × Sumatra, started in 1908 at St. Césaire by Mr Chevalier, superintendent of the Quebec stations, is much larger in size and a heavier yielder than the Comstock Spanish ; the leaf has a finer texture and a better shape ; it is also earlier and more easily cured. This tobacco is sure to become the special type of the province of Quebec, for it seems to be adapted to a great variety of soils. On the comparatively heavy loam of the St. Jacques station, the texture of the product was as fine as on the light loams of St. Césaire. Experiments will be continued in Quebec on the following types : For « wrappers », the Hybrid Comstock × Sumatra; for « fillers », Hazlewood or other Cuban varieties ; for cut tobaccos (pipe and cigarette) Big Ohio. Grown on suitable soils, these varieties will ensure the prosperity of the tobacco growers. The St. Césaire Station is situated in a comparatively new district where the land is in better condition for the growing of tobacco than in the northern district. The summer is milder and the rainfalls are more frequent and more regular. The proportion of light soils is also greater, at least in those parts where the growing of tobacco has been carried on.

In 1909 the varieties grown at the St. Césaire station were : the Comstock Spanish, the Brewer Hybrid, and the Hazlewood.

The county of Essex in South Ontario where the Harrow Station is situated is largely given to the growing of Burley ; this is a large heavy yielding tobacco rather slow in maturing. The climatic conditions of that part of Canada are very favourable to it, and the growing of the Burley is one of the most prosperons industries in South Ontario. A few black tobaccos are grown on a small scale by a few planters. Some aromatic varieties, suitable for « fillers » (Cuban, Hazelwood, Big Havana) were tested this year at this

Station. The Virginia variety, of relatively recent introduction and requiring a special curing process demands like the Burley, a long and warm summer to become sufficiently ripe, but it requires an entirely different soil. The soil must be sandy, or slightly gravelly, very permeable, and contain as small a proportion of lime as possible. Soils of this nature are sometimes met with in the southern part of the county of Essex, but they must be carefully selected.

The Virginia will not only give the grower as good cash returns as the Burley if not better, but grown on a moderate scale in place of the latter, it will enable the grower to avoid the over-production of Burley which has occured in some years. It will fill a real want of the Canadian manufactures, and although the product obtained is sometimes only second grade, it will nevertheless always be able to replace the same product at present imported from the Southern States. The chief characteristic of the flue-cured Virginias is their bright colour obtained and fixed by a special process.

1100 **Report of the Botanic Station of Dominica.** — *Nature*, London, March 16, 1911.

Leeward Isles: Dominica

From the Report of the Botanic Station and Agricultural School of Dominica for 1909-1910 it appears that more than 79 000 plants were sent out during the year as well as large numbers of seeds. The experiments with economic plants include, among others, trials with spineless limes, varieties of citrus plants, Para rubber, and grafted cacao. The lime industry appears to be well established, and the conditions of production are steadily improving. Para rubber continues to do well in the wet districts of the island. Much remains to be done in improving the cacao industry; it is considered that the yield might be considerably higher if better methods were more generally used.

1101 **The Experimentation in the Oasis of Gafsa, Tunis.** (Le Jardin d'essais dans l'Oasis de Gafsa). — *La Quinzaine Coloniale*, N. 7, p. 245 Paris, 10 avril 1911.

Tunis: Gafsa

The Tunisian Department of Agriculture has laid out an experimental field of 1.26 hectares in the Oasis of Gafsa with a training school annexed. The experiments will be made with market-garden produce and fruit trees, in order to lead the natives to cultivate varieties, that would find a ready market in the country. At present the inhabitants of the oasis grow chiefly a poor sort of apricot which they dry in the sun and sell occasionally. There are numerous groves of olives in the oasis, of inferior quality and badly managed. The experiments should be the more convincing, seeing that the water for irrigation will be taken from a well with water of inferior quality to that of the *Oued* used by the natives.

HENNET. **Agricultural Instruction in the Canton of Berne, Switzerland.** — (Das landw. Unterrichtswesen im Kanton Bern). - *Mitteilungen der Fachberichterstatter des k. k. Ackerbau-ministeriums*, N. 7, pp. 49-52. Wien, 1911. **1102**

Switzerland

There are in Switzerland 243 710 agricultural holdings of over 0.5 hectares. For every 244 farms there is 1 pupil attending the agricultural schools. Excluding the farms below 3 hect., there is 1 pupil for every 144 farms.

A project for agricultural instruction on a large scale has been presented in the Canton of Berne. This Canton has already: an Agricultural School at Rütti, with a two years course; a Winter School, also at Rütti, with branches at Langenthal and Munsingen; a French Winter School at Porrentruy and a Dairy School for cheese-making, at Rütti. The Canton contributes besides: to the School for Pomology, Vine-culture and Horticulture at Wädenswil; to the School for Horticulture at Châtelaine-Genève and to the School of Gardening for Women at Niederlenz.

By the proposed law the Canton of Berne must maintain the Annual School of Agriculture, the School for Cheese-making and as many Winter schools as may be necessary. The Canton must also provide for special courses of agricultural instruction, for travelling teachers, for inspectors in the dairy and breeding industries, and for the education of technical experts in agriculture and dairying.

The Annual Agricultural School has developed considerably since the institution of winter schools. The pupils receive complete practical instruction.

The law provides for the institution of markets for breeding animals and cattle for the butcher, and for seeds; for agricultural shows, etc. (1).

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(1) On the expenditure in Switzerland for Agricultural Education, See this Bulletin, No. 1080 and No. 1, Jan. 1911. (*Ed.*).

1103 ALPERA. **Rural Schools in Spain.** (La Escuela Rural en España) *Boletin Oficial de la Camara del Ampurdan, n.* 257, p. 83. Figueras 15 de Marzo de 1911.

Spain In studying the organisation of rural Schools in Spain, Mr. Alpera proposes that agricultural instruction be rendered obligatory to all boys and girls, and that the teaching be done by means of a garden annexed to each School. Itinerant teaching is proposed with the institution throughout the country of agricultural museums and lending libraries.

1104 **Agricultural School in Yucatan.** — *Bulletin of the Pan-American Union.* Vol. XXXII, N. 1, p. 171. Washington. Jan., 1911.

Mexico: Yucatan The Ministry of "Fomento" (*i. e.* Agriculture and Commerce) acting conjointly with the Governor of Yucatan, is about to establish an agricultural school in the State of Yucatan. This step is in accordance with the movement for the founding of these schools throughout the Mexican Republic, so that the vast area of vacant land in Mexico may be made more productive.

In connection with the agricultural school there will be a department for instruction in the various crafts. The entire institution will be known as the Lorenzo Ancona Castillo School, and will be in charge of a president to be elected annually.

It is hoped that the school may be in operation by next winter (1).

1105 **Promoting Agriculture in Tunis.** — (Enseignement agricole et distribution de graines en Tunisie). *Dépêche Tunisienne.* Tunis, 22. févr. 1911.

Tunis The scheme for agricultural experimentation, by the Direction of Agriculture, provides for field experimentation and for the agricultural education of the natives. A Mohammedan teacher must assist in itinerary lecturing and in the distribution of seeds.

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(1) For the labour and cultural conditions of Yucatan, see: JOHN KENNETH TURNER, *Mexico*, London, 1911. See also *The Nation*, London, April 29, 1911, p. 172. (*Ed.*).

R. CHIERICI. **Value of a Sicilian Vineyard, with Vines grafted on American Stocks.** (Calcolo del Capitale-Terra di un ettaro di vigneto su legno americano in Sicilia nelle zone litoranee della Val di Noto). — *L'Agricoltura Italiana*, Anno XXXVII, fasc. 694, pp. 193-203. Pisa, 16 Aprile, 1911. **1106**

Italy: Sicily

The writer observes that the technical and economic conditions of Sicilian vine-growing are radically transformed since the appearance of phylloxera. Vineyards are now nearly all reconstituted in Sicily, and the writer, after studying those of the coast region of the Val di Noto, finds that valuation of the new vineyards must be based on quite different data from the old. The new data must refer to:

a) the cost of planting the American stocks, of grafting, and of the care entailed;

b) the shorter time to be allowed for the vegetation cycle of the vine, and therefore for the period of variation in the revenue.

Calculations were made for five different stations, taking into consideration: that the annual cost of cultivation and plantation remains constant, whatever may be the sale price of the products; that the yearly deductions, within certain limits, may be calculated at a constant percentage; finally taking 15 frs. as the average sale price, per hectolitre, of sweet wine. These calculations show the net receipts per hectare to be 184.44 frs. and the value represented by the land 3688 frs. per hectare.

Comparing the results obtained with 10 frs. and with 15 frs. as the value of the hectolitre, it is seen that for every extra franc on the sale price of the wine, from 10 frs. upwards, the net receipts increase by 22.236 fr. and the land-value by 444.72 frs. per hectare.

Improving Farms in New York State. — New York Land Bulletins. *American Agriculturist*, New York, April 8, 1911. **1107**

United States: New York

The New York State Department of Agriculture undertook five years ago the work of reclaiming neglected or deserted farms of the State.

Descriptions of 2 500 such farms were gathered and published in a first Bulletin stating the prices. Up to January 1, 1911, $ 6 200 000 have been paid to owners of farms sold through the publicity afforded by the Department; and $ 3 000 000 to owners of non-advertised farms by persons who had been attracted by the descriptions published in the bulletins.

According to the fifth Bulletin there are now 1 100 farms for sale or hire in New York State. These aggregate 148 170 acres and the owners value them at $ 4 734 742, an average of $ 31.75 an acre.

During 1910 Commissioner Pearson received no less than 14 000 letters from western farmers inquiring about these farms. These show that the advantages of raising meat and fruit are being recognised as well as the importance of pastures.

The soil for apples cannot be excelled in any part of the country and millions of fruit trees have recently been planted in the Susquehanna and Hudson valleys. Some of the best fruit lands are in Schoharie county and can be had for $ 20 an acre. The new State Bulletin contains descriptions of purchaseable farm land in 50 of the 61 counties of the State.

Agriculture.

Agricultural Physics, Chemistry, and Botany.

1108 L. LINDET. **Selective Power of Vegetable Cells in Presence of Dextrose and Levulose.** — (Sur le pouvoir électif des cellules végétales vis-à-vis du dextrose et du lévulose). *C. R. de l'Acad. des Sciences, T.* 152, No. 12. 20 Mars, 1911, pp. 775 Paris.

France The writer showed, in 1900, that the cells in the leaves and stalks of beet, in contact with the two sugars which constitute inverted saccharose, absorb in preference dextrose, when the conditions are especially favourable to respiration, the dextrose being decomposed; on the other hand levulose serves especially to form new cellular tissue. Similar results have been obtained by Mr. Lindet in studying the selective power of yeast cells, of germinating embryos and of aerobic fungi. Yeast can vegetate both in dextrose and in levulose solutions, levulose appearing more favourable to growth and reproduction, while dextrose is decomposed and oxidised.

Studying the vegetation of embryos of barley and of haricot beans, grown on cotton wool soaked with Raulin's nutritive solution (1), it was shown that if this solution contains inverted sucrose, the seedlings decompose dextrose more rapidly than levulose. If, on the other hand, the Raulin solution contains only levulose, or only dextrose, it is seen that the weight of shoots and rootlets developed in the levulose solution is about double the weight of the seedlings grown in the dextrose solution, when these dry weights are referred to the same weight of sugar that has been decomposed.

Similar conclusions are reached with cultures of aerobic fungi, as *Aspergillus niger*, *Penicillium glaucum*, and *Leuconostoc*. For growth and reproduction, the fungi prefer levulose, while dextrose is consumed in respiration. If cultivated in Raulin's solution, containing inverted sugar, these moulds at first decompose dextrose and levoluse about equally; but gradually, as the mould extends over the surface, and as aerobic conditions become dominant, the dextrose is rapidly decomposed, in a proportion that is about 2.5 the quantity of the levulose decomposed at the same time. It is levulose that contributes chiefly and directly to increase the dry weight of the mould crop.

L. MASSOL. **Action of Ultra Violet Rays on Starch.** — (Action des radiations ultraviolettes sur l'amidon). *C. R. de l'Acad. des Sciences*, T. 152, N. 13, pp. 902-904. Paris, 27 mars, 1911. **1109**

France

Solutions containing 2 % to 1 % of soluble starch (prepared by heating ordinary starch for 3 hours at a temperatnre of 150° C.) were exposed to the action of a mercury vapour lamp, and it was seen that the starch rapidly loses the property of giving the blue reaction with iodine, while it increases in reductive action on Fehling's solution, passing through the same degrees of trasformation observed when starch changes to sugar under the influence of diastase. The reducing sugar thus formed, under the action of ultra-violet rays, appears to be maltose. This transformation must be due solely to photo-chemical action, for the temperature of the solutions exposed to the mercury lamp did not rise above 30° C.

(1) Raulin's solution is prepared by dissolving in 1500 grams of water, the following compounds, in grams: Sugar, 70; Tartaric acid, 4; Ammonium nitrate, 4; Ammonium phosphate, 0.60; Potassium carbonate, 0.60; Magnesium carbonate, 0.40; Ammonium sulphate 0.25; Zinc sulphate, 0.07; Ferrous sulphate, 0.07; Potassium silicate, 0.07. (*Ed.*).

1110 G. ANDRE'. **Variation in Dry matter and Distribution of Mineral Constituents and of Nitrogen in an Annual Plant.** — Conservation des matières salines chez une plante annuelle ; répartition de la matière sèche, des cendres totales et de l'azote). — *C. R. de l'Acad. des Sciences,* T. 152, n. 12, pp. 777-780. Paris, 20 mars, 1911.

France

These experiments were made on the poppy (*oeillette, Papaver somniferum*), determining the variations in the dry weight of the plant, in the total ash, and in the quantity of nitrogen during successive periods of growth .These investigations led to the following conclusions:

1). The absolute dry weight of all the organs increases regularly; only in the case of the leaves a slight diminution was observed, due to increased respiratory action.

The absolute weight of total ash also increases regularly in all the parts of the plant, except in the leaves, where a slight diminution, of about 5 %, is observed in the last period of growth.

2) The weight of total nitrogen in the roots increases at first till July 13th, then continues to diminish till August 9th, the nitrogen evidently emigrating towards the stalks and the flowers. On August 23rd a new increase of nitrogen in the root, up to a maximum, is observed ; this proves that the plant has continued to absorb nitrogen from the soil, and to accumulate it in its organism, even when fructification is nearly accomplished.

The relative weight of nitrogen regularly decreases during growth, increasing only towards August 23rd. In the stalks the absolute quantity of nitrogen goes on increasing till the end of vegetation, although the relative weight of this element continues regularly to diminish.

In the leaves of the poppy, the absolute weight of nitrogen increases until the time of flowering (13th July), then diminishes till the end of vegetation. The relative weight of nitrogen in the leaves diminishes regularly during all the life of the plant.

In the fruits the absolute weight of nitrogen increases very rapidly during ripening, but its relative weight varies slightly.

The migratory variations of phosphoric acid are more regular than those observed in the case of nitrogen. The variations in the quantities of potash appear to follow very closely on those of nitrogen.

G. André. **Conservation of Saline Constituents and their Distribution in an Annual Plant.** — (Conservation des matières salines chez une plante annuelle ; répartition des éléments fixes). *C. R. de l'Acad. des Sciences*, T. 152, N. 14, pp. 865-967. Paris, 3 avril, 1911. **1111**

France

As in the preceding paper, the observations were made on the poppy, in the following periods of its growth : I.) June 13th 1910 ; II.) June 28th, during budding ; III.) July 13th, during flowering ; IV.) August 9th, when the fruits were nearly ripe ; V.) August 23rd, at complete maturity. The organs examined separately were the roots, the stems, the leaves, and the fruits, in each of which, during the five periods of growth the dry weight, phosphoric acid, and potash and other mineral constituents were determined.

Some of the conclusions are given in the preceding paper. The absolute weights of calcium and magnesium increase regularly in all the organs. As in the case of nitrogen, during all its vegetation, the poppy has lost none of its fixed constituents. Some saline constituents, however, may be carried away by leaching, or rather by exosmosis. The conditions that affect the exosmosis of some alkaline constituents of plants are not yet well understood.

Dangeard. **On Chlorophyll Assimilation in the Cyanophyceae.** — (Sur le conditions de l'assimiliation chlorophyllienne chez les Cyanophycées). *C. R. de l'Acad. des Sciences*, T. 152, N. 14, pp. 967-969. Paris, 3 Avril, 1911. **1112**

France

By means of changes in growth, it is possible to obtain a photographic registration of the rays which produce chlorophyll-synthesis (1).

This method has been applied to organisms in which chlorophyll is mixed with other pigments, as in some Cyanophyceae (*Oscillaria* and *Phormidium*). It has been proved that with these algae there is no maximum of growth within the limits of the green rays ; in the case of Phormidium growth is especially favoured near the infra-red limit of the spectrum.

The Cyanophyceae therefore utilise for growth the orange and the infra-red rays : a step in the direction of the Sulphurariae. In the case of Sulphurariae, the Sulphur algae, the dark heat rays beyond the line A of Frauenhofer attract the algae and are doubtless utilised for their growth.

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(1) See this *Bulletin*, Feb. 1911, N. 382. (*Ed.*).

1113 F. Kövessi. **On the Question of the Assimiliation of free Atmospheric Nitrogen by means of special Hairs in Plants.** — (Nouvelles recherches sur la prétendue utilisation de l'Azote de l'Air par certains poils spéciaux des plantes). *C. R. de l'Acad. des Sciences*, T. 152, N. 13, pp. 888-890. Paris, 27 mars, 1911.

Hungary

Mr. Jamieson and, later, Messrs. Zemplèn and Roth, observed on certain plants special hairs to which they attribued the properties of absorbing the free nitrogen of the air and producing albuminoid matter.

Preceding researches of Mr. Kövessi (*C. R. de l'Acad. des Scienc.*, T. 159, p. 56, 1909) did not confirm this opinion. On two sets of plants, one set cultivated in the open air, and the other in an atmosphere from which nitrogen was excluded, these hairs showed the same development and produced exactly the same reactions.

By still more rigorous experiments, made with cuttings of *Robinia Pseudacacia, Robinia hispida, Ribes Grossularia, Aesculus Hippocastanum, Acer platanoides, Acer pseudoplatanus*, Mr. Kövessi has again shown that these hairs behave in exactly the same way in free air and in pure oxygen, whence he concludes:

1) The hairs on cultivated plants, whether in the open air, or in an atmosphere from which nitrogen is excluded, develop in exactly the same way. The same may be said of the special hairs studied by Messrs. Jamieson, Zemplèn and Roth;

2) Hairs taken from organs of the same age and state of development, when treated with the reagents that show the presence of albuminoids, gave exactly the same results;

3) These experiments sufficiently prove that the nitrogen in these albuminoid substances is not derived from the air.

1114 F. Scurti and G. Tommasi. **On the Formation of Fatty Matter in Olives.** — (Sulla formazione del grasso nei frutti oleaginosi). *Rendiconti della Società Chimica Italiana*, Serie II. Vol. III, fasc. IV. Roma, 1 Aprile, 1911.

Italy

Experiments have shown that the fatty matters formed in oil-fruits, such as olives, have neither the same origin nor the same biological function as the reserve materials in oily seeds. In fact, in green berries there is no migration of carbohydrates to justify the idea that their fatty acids are formed at the expense of carbohydrates. It has been proved by direct experiment that the fatty matter is not formed until after the fruit is completely developed.

Some olives were gathered on August 3rd., when no bigger than peas, and exhausted in ether, which only extracted mere traces of fats and remarkable quantities of oleanol, a waxy alcohol of which the molecule contains 31 atoms of carbon. The olives of a second gathering, 15 days later, contained oleanol in association with non-saturated fatty acids (oleic and linoleic) and saturated fatty acids. At the third gathering it was found that the fatty matter in the fruit is composed chiefly of the oil, which, by the 6th gathering, on October 20th, had acquired its normal properties.

It is thus seen that the formation of the fatty matter in the mesocarp of the olive is not analogous to the process in oily seeds. In the olive-berry the flesh seems to be an organ for the secretion of the waxy alcohol above-mentioned, which is an elaboration product of the leaves. This alcohol is destroyed as the fruit ripens. It is by a process of demolition of the molecule of these compounds so rich in carbon, transforming themselves successively into fatty acids, that the neutral fatty matter is finally formed.

E. VASSALLO. **Injecting of Plants with Mineral and Organic Substances.** — (Comportamento delle sostanze organiche ed inorganiche negli organismi vegetali) *Gazzetta Chimica Italiana*, Anno XLI, fasc. II and III, pp. 342-352. Roma, 17 Aprile, 1911. **1115**

Italy

To facilitate research on the activity and the transformations of certain substances in plants, the writer began a series of experiments with specially constructed apparatus that enabled him to cause the absorption, under pressure, of solutions of these substances by roots.

The root is laid bare with precaution, the tip cut off and the indiarubber tube of the apparatus applied to the section and tied in place. The apparatus is a pump with a reservoir containing the solutions to be injected.

It was ascertained that all the liquid injected was absorbed and remained in the plant, without filtering out of the root tissues.

The first experiments showed that vigorous roots can support a pressure of more than 80 cm. of mercury. A plant may be made to absorb a large quantity of liquid by this means, and one important advantage of the system is that it admits of experiments being carried out upon plants in normal physiological conditions and large enough to yield considerable experimental data. The writer has already ascertained that the power of absorption increases with the diameter of the root injected and is highest when the activity of the plant is at its maximum.

1116 O. V. Lippmann. **Appearance of d. Galactose in Ivy-Berries.** — (*Ber. chem. Ges.* XLIII, p. 3611, 1910). *Journ. de Pharmacie et de Chimie,* 103e année, 7e Série, T. III, N. 7, p. 358. Paris, 1er Avril, 1911.

Germany After a sharp night frost in dry weather, after an autumn characterised by a constant high temperature, a mass of ivy presented a remarkable appearance. The most projecting berries, which had been most exposed to the frost, were covered with a white, brilliant substance which proved, on examination, to be d-galactose. Free sugar had hitherto been rarely found, and not with certainty, in ivyberries.

1117 N. Ivanoff. **Action of Stimulants on Plant Respiration.** (Die Wirkung der nützlichen und schädlichen Stimulatoren auf die Atmung der lebenden und abgetödeten Pflanzen). *Biochemische Zeitschrift,* 52 B. 1 H., pp. 94-96. Berlin, 1911.

Russia It is known that the respiration of living plants is stimulated not only by nutritive matter but also by poisons. The identity of the result springs doubtless from different chemical reactions of the cells. In the first instance there is a reaction to nutrition, in the second, to poisoning. While the difference cannot be observed on living plants, the writer was able to observe it on dead plants.

Thus useful stimulating phosphates exert no influence on the respiration of living plants, but increase it in dead plants. Poisons, on the contrary, which are harmful stimulants, sometimes strongly excite the respiration of living plants, while on dead plants they either have no action, or they distinctly prevent respiration (quinine, urethane, according to the experiments of W. Palladin).

Thus, by eliminating the active principle that regulates living protoplasm it becomes more easy to determine clearly the stimulants useful or harmful to vegetable respiration.

1118 E. P. Sandsten. **Some Conditions which Influence the Germination and Fertility of Pollen.** *Twenty-fifth and Twenty-sixth Annual Reports of the Agricultural Experiment Station of the University of Wisconsin.* Research Bulletin N. 4 8vo, pp.VII + 52 + 228, (149-172). Madison, 1910.

United States: Wisconsin This work is confined principally to a study of the pollen grain as affected by various external conditions, together with a brief presentation of its purely botanical relations. The principal conclusions arrived at may be summarized as follows:

1) The first noticeable change in the germination of the pollen grain is the swelling of the grain due to the absorption of water; the rate of absorption depends on the temperature, concentration of the culture media and in some cases upon sunshine. The greater the concentration the less rapid is the absorption and germination. In these experiments the presence of diastase and invertase has been confirmed both in the pollen grains and in the tissues of the style and stigma.

2) Most pollen grains will germinate in a solution of cane sugar. The degree of concentration differs with the different species of plants. It is possible that this fact may to some extent be a barrier against a promiscuous cross-fertilization in Nature and in horticultural practice.

3) The vitality of pollen is not seriously affected by temperatures ranging from 25° to 55° C., in a dry atmosphere. Temperatures under 25° seriously interfere with germination. A temperature from 70° to 80° C. in a saturated atmosphere is fatal to the pollen of the peach, apple and plum. At a temperature of 40° to 50° C., in a saturated atmosphere, the pollen grains burst open in consequence of the rapid absorption of water and the number of burst grains increases with the temperature. This bursting of pollen grains actually takes place in masses of apple and plum pollen during warm spring rains. Freezing temperatures ranging from — 1.° 5 to — 1.° C. were not seriously injurious to the pollen of apple, pear and plum, while less than 50 per cent of peach and apricot pollen were killed by these low temperatures. The pistils of the species named were more susceptible to the low temperatures than pollen. Temperatures ranging from — 1.° 5 to 0° C. killed pistils.

4) Sunshine had little or no effect on the germination of pollen, or upon the growth of the pollen tube, in most plants. But the germination and growth of the pollen of the tomato is decidedly retarded by cloudy weather, and also the anthers of the tomato require a certain amount of sunshine for the proper development of the pollen. The same is true in several species of *Lilium*.

5) Bad culture and insufficient manuring in orchards greatly injures the production and fertility of pollen.

6) The longevity of apple, pear and plum pollen depends on the conditions in which it is kept. If kept in a dry place at a temperature ranging from 7° to 26° C., apple pollen can be kept for six months or longer, while only a small amount of plum pollen germinated after being kept for six months. Pollen may be safely

shipped from one part of the country to another without losing vitality or fertility.

7) Under favorable conditions it requires 9 to 32 hours for the pollen tube of apples, plums and cherries to reach the ovary when placed on the stigma. The stigma of apple flowers is receptive from 4 to 6 days, whether pollinated or not. Continuous rainy weather for days would probably prevent fecundation and result in the total failure of the crop.

1119 LUCIEN DANIEL. **Biometric Study of the Offspring of Grafted and Ungrafted Haricot Beans.** (Etude biométrique de la descendance de Haricots greffés et de Haricots francs de pied). *C. R. de l'Acad. des Sciences*, T. 152, N. 15, pp. 1018-1020. Paris, 10 avril, 1911.

France In order to see whether the influence of the stock was perceptible in the offspring of black Belgian haricot beans grafted on the large white beans of Soissons, Mr. Daniel sowed in 1909, and again in 1910, seed from grafted plants. He formed five lots, of 1008 seeds each, and measured them in length, width and thickness. Comparing them with control seed of black Belgian ungrafted haricot beans, he found:

1) The degree of variation is the same as regards thickness, being sometimes smaller for the width; sometimes greater and sometimes less for the length.

2) The dominant characters remained the same for width and thickness, and the graft seemed to have fixed the average type.

3) Speaking generally, the graft produced individual cases of variation, but the prevalent variation was sufficiently consistent to be attributed entirely to the influence of the stock on the offspring of the graft.

4) The diminution in size, noticed in the seeds of the grafted haricots, is very marked in their offspring.

As regards size of seed, therefore, a character acquired in consequence of grafting showed itself in these experiments to be remarkably hereditary.

1120 H. TEDIN. **Is the Proportion between Skin and Cotyledons specific in Peas?** (Ar skalhalten hos ärter en sortegenskap?). *Sveriges Utsädesförenings Tidskrift*, A. XXI, H. 2, pp. 72-77. Malmö, 1911.

Sweden In order to determine whether the relative weight of the skin of peas to their cotyledons is a hereditary character, Mr. Tedin examined 27 samples of 15 varieties of peas, 13 of which were of *Pisum* *sativum* and 2 of *Pisum arvense*. Except the variety *Victoria*, they were all pedigree varieties, raised at Svalöf. In 12 yellow varieties the differences were very slight; in 2 others the differences for peas of the same sample were greater than for two different varieties, which shows that possible hereditary character will be difficult to discover.

In the *Concordia* variety Mr. Tedin observed a higher proportion of skin, due perhaps to the flattened form of these peas. The higher proportion of skin in field peas seems a specific quality.

The author confirms the relationship established by Fruwirth (1), that the smaller the pea the heavier is its skin. This, however, is only true among the individuals of a pure strain. The author states that this relationship is of no use in selection.

1121

A. J. CELINZEV. **Criteria for the Establishment in Russia of Stations for Plant-Breeding.** — (Ob orientirovanii Seleksionnekh Rabot po Economiceskim Raionam Selskago Khosiaistva). *Khosiaistvo* (*The Home*), VI G., N. 9, pp. 263-269. Kiev, 3 mars, 1911.

Russia

A lengthy article in which the conditions of European Russia are studied with a view to the establishment of Stations for Plant-Breeding. Russian territory is divided into eight different zones, according to the different conditions of the soils and of the development of agriculture. The writer especially recommends that besides the study of cereals attention be given to all kinds of forage crops, the importance of which is becoming daily greater in Russia.

1122

F. B. GUTHRIE. **Testing Flours and breeding Wheats for « Strength ». The Present Position of the Flour Question.** (A paper read before the Sixth Federal Convention of Master Bakers of Australia, Sydney, October, 1910). *Agricultural Gazette of* N. S. W. Vol. XXII Part. 2, Sydney, February 2, 1911.

Australia: New South Wales

The present position of the flour question may be summed up briefly in the statement that wheats that yield a strong flour, are not produced in quantities sufficient to supply the demand, coming especially from English millers, and command in consequence a high price. In the principal wheat-producing countries, the United States, Canada, and India and in England itself, systematic efforts are being made to raise varieties possessing this important characteristic of flour strength in addition to other desirable qualities.

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(1) K. FRUWIRTH. *Das Schalengewicht der Hülsenfruchten, etc.* Fühling's Landw. Zeitung, 1898, h. 12.

The Home-grown Wheat Committee appointed by the National Association of British and Irish Millers, consisting of practical millers and farmers, makes its chief object that of testing British wheats, and scientific experiments have been undertaken in the laboratories of Rothamsted and of Cambridge University. The same Association, after its recent meeting at Chester, passed a resolution affirming the desirability of establishing a National Cereal Selection Station.

Australia has done pioneering work in this direction, Mr. Wm. Farrer was the first to see the importance of selecting wheat for strength; he realised the value of wheats of the Fife class in perpetuating this characteristic and he relied on cross-fertilisation and selection rather than on selection alone in order to produce the required results.

In order to place the problem on a satisfactory basis, the British Home-grown Wheat Committee has arrived at the following definition of flour-strength: as « The capacity to make a big well raised loaf». What exactly determines this important quality is not accurately known and the only reliable test of the strength of a flour is its actual behaviour on baking. Several factors have been suggested as being responsible for strength of flour, such as the quantity of gluten, its chemical nature, amounts of sugar, of mineral constituents; but so far none of them have provided a satisfactory solution of the problem. The only test that has proved satisfactory is the « water-absorbing capacity » of the flour. Mr. Farrer's strong-flour wheats were submitted to this test, and were retained or rejected according as they gave flour of high water-absorbing power or not.

This quality in wheat is to some extent affected by environment, by the nature of the soil and climate, and particularly by the kind of weather during the ripening period of the grain. A hot and dry summer which rapidly ripens the grain after it is formed always increases flour strength. This flour strength is however an inherent characteristic of certain varieties, and soft wheats, though they may become stronger under hot and dry conditions, never attain the flour strength of the harder varieties. Flour strength is an inherited characteristic, and can be bred for just as colour, stiffness of straw, stooling, beards etc. can be bred for. It would appear that strength and weakness are Mendelian pairs and the breeding of strong-flour wheats becomes, in competent hands, an operation which can be regulated in the same manner as other characters.

Strength does not appear to be affected by manuring. Even nitrogenous fertilisers, which might be expected, by increasing the protein matter, to also increase the strength, appear to have no effect in this respect. It is doubtful whether any very great advantage is to be gained by breeding for increased gluten content alone. But flour-strength is almost invariably associated with fairly high gluten-content.

There is very little to choose in nutritive value between bread from strong or from weak flour; but a given quantity of hard or strong flour provides more nutrition in the form of bread than does the same quantity of weak flour. (1).

P. REMLINGER. **On the Carriage to Great Distances of Samples of Water for Bacteriological Analysis.** — (Transport à grande distance des échantillons d'eau destinés à l'analyse bactériologique). *C. R. de l'Acad. des Sciences,* T. LXX, N. 12, pp. 468-469. Paris, 31 mars, 1911. **1123**

France

The carriage of samples of water to great distances for bacteriological analysis is so difficult as to be sometimes not practicable. Mr. Remlinger succeeded several times in having water sent from Constantinople to Châlons, in France, and in analysing it before the multiplication of the germs set in.

Without having recourse to ice, which entails difficulties, this result was secured by adding sea-salt to the samples of water in the proportion of 10 %.

E. KAYSER. **Researches on the Extract of Beer Yeast.** — (Recherches sur le suc de la levure de bière). *See this Bulletin,* No. 1262. **1124**

France

Nitro-culture for inoculating Lucerne and Clovers. (Press. Bulletin). *The Farmer's Advocate,* London, Ontario, April 6, 1911. **1125**

Canada Ontario

During every season since 1905 the Bacteriological Laboratory of the Ontario Agricultural College has sent out to farmers bacteria cultures for inoculating seed of alfalfa and several clovers in order to aid in ensuring a more vigorous growth. Experience has shown that the most satisfactory method of inoculation is to apply the bacteria directly to the seed before sowing.

Last year there were 3375 of these bacteria cultures sent to 1881 farmers, and of 771 who returned reports, two thirds stated that the inoculation of the seed had aided in securing a better crop. During the present season the College will send cultures for the inoculation of the following kinds of seeds: alfalfa, red or mammoth clover, alsike clover, white clover, crimson clover, vetches, peas, beans, and sweet peas. Each kind of seed requires a different bacteria culture. The cultures are sent by post with full instructions for their use.

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(1) See this Bulletin, December 1910 p. 333 and January 1911, No. 93. (*Ed.*).

1126 L. RUDAUY. **Rainfall in France during 1910.** — (La pluie en France en 1910). *La Géographie,* XXIII, N. 3, pp. 200-203. Paris, 10 mars, 1911.

France The year 1910 was remarkably wet in France. In the following table the rainfall for 1910 is compared with the average values, the figures being those of the French Central Meteorological Bureau. The places named are in widely different parts of France and are in different physical conditions.

Locality	Rainfall in 1910 mm.	Average annual Rainfall mm.
Perpignan	559.4	501
Paris (Parc St. Maur)	750.3	565
Marseille	812.3	567
Toulouse	775.2	666
Dunkerque	669.9	716
Nantes	1045.7	wanting
Ste. Honorine du Fary (Calvados)	1062.0	wanting
Lyon	923.2	814
Brest	966.6	824
Bordeaux	1061.0	848
Besançon	1484.1	1108
Pic du Midi	2118.0	1490
Mont Ventoux	1455.1	1544
Puy de Dôme	2549.2	1586

1127 J. A. PULMAN. **Action of Weather and Moisture in Soil on the Growth of Buckwheat.** (Opiti nad Vliianiem Meteorologhitceskikh Uslovii na Proisrastanie Grecikhi). *Exegodnik Glavnago Upravlenia Semlieustroistva i Semledielia po Departamentu Semledielia. (Year-Book of the Administration of Rural Organisation and Agriculture, Department of Agriculture).* G. III, *pp.*67-69. Peterburg. 1910.

Russia Independently of the time of sowing and of the nature of the soil, if there is sufficient rain in the period between the flowering and the formation of the grain the yield will be good. In experiments at the Station of Borodizk this period was divided into two parts, the second beginning with the formation of the grain, the following correspondence being observed between the harvest and the weather:

During bad years, when the harvest was not more than 18 *pud.*

	1st half	2nd half
Temperature in the 24 hours	20.°1 C	21.°1 C
Nebulosity, %	42	42
Total rainfall, mm.	14.0	8.2

During good years, when the harvest varies between 40 and 80 *pud.*

	1st half	2nd half
Temperature in the 24 hours	18.°4 C	19.°3 C
Nebulosity, %	60	63
Total rainfall, mm.	34.2	39.0

When, after favourable conditions up to the period of flowering, the weather becomes too dry there will be a large production of straw but little grain. In the opposite case, the yield in straw will be less, that in grain higher.

Numerous pot experiments were made to determine the action of soil- moisture on the growth of buckwheat. The following table gives the results:

	Number of Pots			
	I	II	III	IV
Soil-moisture, %:				
From flowering to formation of grain . . .	34	34	25	24
From formation to maturity of grain . . .	24	34	34	24
Total crop, grams	3.90	5.74	3.62	3.27
» straw, »	2.30	2.70	1.90	1.50
» chaff »	0.75	0.98	0.36	0.57
» grain »	0.85	2.06	1.36	1.20
Number of good, ripe grains	40	96	60	53
Proportion % between weight of chaff and of ripe grain	53	67	80	67

Given constant moisture in the two periods, the greater the moisture, the higher the yield. The maximum is given by a constant moisture of 34%. During the second or flowering period, a reduction of moisture from 34% to 24% has a bad effect on the yield; but an increase of moisture from 24% to 34% at the same period gives a considerable increase of grain.

1128 J. A. PULMAN. **Buckwheat and Frost.** (Opeti s Grecikhi).) - *Exegodnik Glavnago Upravlenia Semlieustroistva i Semliedielia po Departamentu Semledielia,* (*Year-Book of the Administration of Rural Organisation and Agriculture, Department of Agriculture*), G. II, pp. 70-71. Peterburg, 1910.

Russia

Temperatures of - 1° and - 2° C. do no harm to buckwheat seedlings, but at - 2.5° the tenderest leaves begin to suffer; at- 4° nearly all the plants are damaged, and at - 6° they are killed.

Observations have shown:

a) that seedlings at 3 days old are more sensitive to cold than at 5 days;

b) that when the thickness of sowing is equal, more damage is done on moist soil;

c) that by selection more resistant varieties may be obtained.

By sowing buckwheat before April 25 through a long series of years, the Experiment Station at Borodzk has produced a type that resists — 4° C. and has already been grown with success in various localities in the Government of Kursk.

1129 G. A. PULMAN. **Effect of Weather on the Growth of Oats and Millet.** (Vliianie Meteorologhiceskikh Uslovii na Proisrastanie Ovza, Prosa i Grecikhi). Exegodnik Glavnago Upravlenia *Semlienstroistva i Semledielia po Dep. Semledielia.* (*Yearbook of the Administration of Rural Organisation and Agriculture Department of Agriculture*), G. III, pp. 71-74. Peterbug.

Russia

Diagrams are given determining the influence on vegetation of different meteorological conditions, as atmospheric temperatures, cloudiness, rain-fall. These diagrams point to the following conclusions:

OATS. — 1) In years of good harvest, during the 10 days preceding formation of the ear there was abundant rain, rather low temperature and a cloudy sky.

2) In years of bad harvest, during the same period there was very little rain, the temperature was rather high and the sky clear.

3) Up to this period, whatever the outer conditions, the growth of the oats is uniform and slow; but after the formation of the ears, up to harvest, they grow rapidly in favourable years. Rain is the most important factor, and the critical period is within the 10 days preceding the formation of the ears, generally in June.

MILLET. - In the period between the formation of the leaves and the appearance of the flower, temperature is the most important factor, and should not fall below 18°. C., the optimum being between 19° and 22.° Severe cold delays the appearing of the flower, and delay is always an indication of a bad crop.

As regards rain, if, in the 20 days between flowering and the ripening of the grain, the rainfall is below 30 mm. the yield will be below average.

Rumanian Soils. (Les sols de la Roumanie). — *Revue Scientifique*, 49 année, N. 16, p. 503. Paris, 22, avril, 1911. **1180**

Rumania

The Geological Institute of Bucarest has lately published a geological map, signed by Mr. Murgoci, scale 1 : 2 500 000, representing fourteen types of soil. The following table gives these types, with the maximum and minimum content of physical and chemical elements, according to Murgoci:

ANALYSIS OF TYPICAL RUMANIAN SOILS (%).

FORMATION	Mechanical Analysis Diameter of particles					Chemical Analysis						Observations
	About 1 m/m	1 to 1/4 m/m	Less than 1/4 m/m	Clay	Humus	Loss by desiccation	Humic Acid	Lime, CaO	Phosphoric Acid, P_2O_5	Nitrogen	Potash, K_2O	
I. Steppe soils:		Max						Max				
Dry steppe, light yellow loam	—	—	—	—	—	5.5	1.1	2.8	0.2	0.2	0.18	
Dry steppe, reddish loam	0.2	1	60	37	4	6	1.5	2	0.4	0.2	0.27	On Russian frontier
Tchernoziom, brown colour	0.15	3.6	57	6	5	6	—	2	0.23	0.16	0.37	The most extensive
Tchernoziom common (Russian).	—	—	—	—	8	8	—	—	0.1	0.27	0.5	
Tchernoziom, decomposed .	—	8	48	45	2	7	1.8	1.9	—	0.27	—	
II. Forest soils:												
Brown oak-forest soils . . .	—	10	50	36	4	5	1.1	0.8	0.1	0.17	—	
Podzol: pale sand with oak and beech forests.	1.3	1.6	44	54	2	6	—	0.1	0.04	0.16	0.15	One analysis
III. Soils on rocks *in situ*:												
Stony forest soils of the Carpathians.	1.4	8	46	46	—	5	1.5	0.4	—	0.17	—	
Terra rossa, red soil of the West (Permian-Trias).	—	—	—	—	—	—	—	—	—	—	—	Very limited
IV. Recent silt soils:												
Danube silt	—	—	—	—	—	8.5	—	3	0.13	0.3	0.3	
Alluvium from large rivers.	Coast dunes, salt soils and lakes, swamps. (Lacoviste).											

1131 T. L. LYON AND J. A. BIZZELL. **Relation of Certain Crops to the Nitrate Content of Soils.** (J. Franklin Institute 171, 1-16 pp. 205-220 1911). *Journal of the Society of Chemical Industry,* No. 5, Vol. XXX, London, March 15, 1911.

Great Britain

Experiments made with Timothy grass, maize, potatoes, oats, millet and soy beans showed that on the same soil the amount of nitrate present was different for each crop. At different stages of growth there was a characteristic relationship between the crop and the soil's nitrate content. During the most active growing period, nitrates were more abundant in the soil under maize than in the same soil when uncultivated; at the same period the nitrate content was higher under a mixture of maize and millet than under millet alone, though the amount of crops obtained was about the same in the two cases. Apparently nitrification is stimulated by some processes connected with the active growth of plants, particularly of maize. Part of its nitrogen is however obtained by the maize plant in some other form than nitrates; and the amount of nitrate was higher at the time when the crop was taking most nitrogen from the soil than in the later stages of growth under both maize and oats, although the nitrates in the uncropped soil were decreasing. Under maize, oats, and millet, the nitrate failed to increase late in the season, when the absorption of nitrogen had practically ceased, although the amount of nitrate in the uncropped soil was increasing rapidly. Apparently plants during their later period of growth exert a retarding influence on nitrification.

Changes in the moisture content or in the temperature of the soil under crops during the growing period had but little effect in the amount of nitrate present.

On the other hand on uncropped soil a marked increase in nitrates followed an increase of moisture in September.

The large differences in the nitrates under the crops studied are attributed to inherent differences between plants of different species in their stimulating influence on nitrification, or the reverse.

1132 A. CONTINO. **Manganese in Italian Soils.** (Sulla quantità di manganese in alcuni terreni italiani). *Le stazioni Sper. Agr. Italiane,* Vol. XLIX, f. 1, pp. 51-54, Modena, 1911.

Italy

In analysing 21 samples of soils from South Italy and 2 from North Italy, Mr. Contino found a minimum of 0.03, and a maximum of 0.485, or an average of 0.17 of oxide of manganese (Mn_3O_4).

Soils in other countries have given similar results. If one kilogram of soil contains on an average 1 gram of this oxide, a hectare would contain a far greater quantity than is generally recommended in ordinary manuring, and which is necessary to plants. Manganese compounds in the soil must act chiefly as catalysers.

J. A. PULMAN. **Action of Soil-Moisture on the Growth of Oats.** — (Vliianie Vlaxnosti Potcvi na Uroxai Ovzà). - *Exegodnik Glavnago Upravlenia Semlieustroistva i Semledielia po Departamentu Semledielia.* (*Year-Book of the Administration of Rural Organisation and Agriculture, Department of Agriculture*), G. III, pp. 74-75. Peterburg, 1910 (1). **1133**

Russia Numerous experiments have been made in pots at the Borodizk Station, to observe the action of soil-moisture on the growth of oats between the appearance of the ear and the setting of the grain. This may be called the « critical period » of oats with regard to the factor *moisture*. The following table gives the results of these experiments:

Number of pots		10	14	11	13
Soil Moisture %	from germination to maturity	34	34	24	24
	from appearance of ear to setting of grain	34	24	24	34
Weight of grain, grams,		2.00	1.58	1.88	1.80
Weight of straw, »		2.06	1.17	1.15	1.49
Weight of chaff, »		0.80	0.54	0.49	0.61
Total crop, »		4.86	3.29	3.52	3.90
Number of Grains	large and well formed	64	39	47	56
	small,	17	28	41	27
Total number of grains		81	67	88	83
Length of stalk, centimetres		58	56	39	47
» of panicle		14	13	11	15
Total length of plant		72	70 (?)	50	62
Number of well developed stalks		3	2	4	3
» » imperfectly developed stalks		4	4	1	1
Total number of stalks		7	6	5	5

This table shows: 1) that the optimum is given by a constant humidity of 34; 2) with a decrease in moisture from 34 to 24, coming exactly at the « critical period », the yield diminishes by 32 %; 3) if the moisture rises from 24 to 34%, at this period, there is an increase of 11% on the average yield; 4) the number of the seeds is higher with a constant moisture of 24, but in size the seeds are much reduced.

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(1) Compare with the experiments on buckwheat: this *Bulletin*, No. 1127 (*Ed.*)

1184 **Land-Drainage in Montenegro.** (Montenegrinische Entwässerungsarbeiten). *Report of Austrian Consul. Oesterreichische Monatsschrift für den Orient,* N. 3, p. 43. Wien, März, 1911.

Montenegro Two Italian engineers have presented a project for the drainage of the marshy area which extends between Dulcigno and the river Bojana. The Montenegro Government has ceded the land in question for 30 years to the Society undertaking the work of drainage.

1185 **Spain** **Irrigation Project for Andalusia in Spain.** (Projet d'irrigation en Andalousie). *See N.* 1083 *of this Bulletin.*

1186 **Extensive Irrigation Scheme in Mexico.** — *Bulletin of the Pan-American Union.* Washington, Jan. 1911. p. 167.

Mexico On the initiative of the Mexican Agricultural Department of the Ministry of « Fomento » a plan has been completed for the organization of a Federal service of irrigation throughout the Republic. The Government is about to invest large sums of money in building great reservoirs for collecting the waters now going to waste.

The country will be divided into ten zones, preference being given to such districts as promise the greatest success and the best returns.

It is believed that at least 10 000 000 hectares of land can be reclaimed and made among the most productive in the Republic. The report made to the Ministry of « Fomento » indicates that the amount of irrigated land would increase the annual agricultural production of the country by 300 000 000 dollars and in addition to this increase of agricultural resources, irrigation would make the crops of these regions practically certain each year.

1187 **Irrigation Work in South Argentine, in the Neuquen Valley.** *Bulletin of the Pan-American Union.* Washington, Jan. 1911, p. 143.

Argentina The President of the Argentine Republic has recently approved the contract entered into between the Minister of Public Works and the Buenos Aires Great Southern Railway Co. for the execution of irrigation works in the valleys of the Neuquen River and the Rio Negro.

According to the terms of the contract the company is merely the constructor of the works, while the Department of Public Works will prepare the plans and appoint the technical staff.

The works to be executed by the Great Southern Railway Co. are those comprised in the first section of the zone of the valleys, *i. e.*, between Lake Pellegrini and the Chinchinales station. A dam is to be thrown across the Neuquen River and an intake canal will be cut at this point for the irrigation works. In connection with this dam there is to be a canal for the diversion of the flood waters into a large natural basin, known as the « Cuenca Vidal ».

M. AUFRAY. **Amounts of Ammonia and Nitric Acid in Rain-water in Tonking.** (*Bull. Econ.*, Hanoi-Haiphong, 1909 12, 595-616). *Journal of the Chemical Society*. Abs. ii 224. London, March 1911. **1188**

French Indo-China

The amounts of nitrogen as ammonia or as nitrates were estimated in 123 samples of rain-water, collected in the Botanic Gardens, Hanoi, from April 1902 to March 1905, and in 313 samples collected from June 1906 to September 1909 in an open space in the middle of the same town. Assuming the composition of the samples to represent approximately the whole rainfall, the average amounts of nitrogen per million and the total amounts per acre for the six years would be as follows :

	Rainfall. inches	N. per million. as ammonia.	N. per million. as nitrates.	N. per acre (lbs.) as ammonia.	N. per acre (lbs.) as nitrates.	Total.
1902-3	90.55	0.71	0.66	14.74	13.42	28.21
1903-4	59.68	0.99	0.88	13.34	10.89	24.23
1904-5	84.72	0.64	0.43	12.25	8.26	20.51
1906-7	49.92	0.54	0.36	6.13	4.06	10.19
1907-8	57.91	0.33	0.27	4.39	3.54	7.93
1908-9	77.72	0.23	0.15	4.04	2.65	6.64

or, in metric measures:

	Rainfall. mm.	N. per hectare (kgr.) as ammonia.	N. per hectare (kgr.) as nitrates.	Total.
1902-3	2299.9	16.50	15.08	31.59
1903-4	1412.8	14.94	12.19	27.13
1904-5	2151.8	83.72	9.25	22.97
1906-7	1267.9	6.86	4.54	11.41
1907-8	1470.9	4.91	3.96	8.88
1908-9	1974.0	4.52	2.96	7.49

Of the total rainfall, about 82 % falls from May to October and this contains about 84 % of the total nitrogen (1).

1139 K. STÖRMER. **Influence of Straw on the Nitrogen in Green Manure** (Versuche über die Beeinflussung der Wirkung des Gründüngungs-Stickstoff durch Zugabe von Stroh). — *Fühling's Landw. Zeitung*, 60 J. H. 6, pp. 185-198. Stuttgart, 15 März, 1911.

Germany: Württemberg

The writer recalls the fact that the utilisation of the nitrogen contained in green manure is relatively slight: from 25 to 40 %. As a continuation of preceding researches, Mr. Störmer has studied the influence of straw, which is rich in carbo-hydrates, on the utilisation of the nitrogen in green manure, the slight results of which would be due to the fact that decomposition takes place in a substratum too rich in albuminoids.

Three series of experiments were carried out, from 1905 to 1907, at the Leipzig Agricultural Institute. Field experiments with oats, and with summer wheat; pot experiments with oats and with mustard. These experiments were made in heavy soils; others, in pots, were in light soils. All the field-plots received per hectare: 1.5 qls. 40 % salts of potash; 2 qls. superphosphates; 20 qls. lime; 0.5 qls. nitrate of sodium. The green manure was a mixture of beans and vetches, in the proportion of 1.5 ql. per *are*, and the action of straw was studied in the five following lots, each 1 *are* in size:

1) not treated; 2) chopped wheat-straw 0.5 ql. per are; 3) long wheat-straw, 0.5 ql.; 4) green manure and chopped straw, 5) green manure and long straw 0.5 ql.

From these experiments Mr. Störmer observed that:

1) The addition of straw to green manure, whether in the field or in pots, with heavy or light soils, does not favour the utilisation of the nitrogen of the green manure.

2) It would rather appear that straw has really a fixing effect on a part of the nitrogen. During the first year, in fact,

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(1) Compare with: J. W. LEATHER. *Composition of Indian Rain and Dew.* Mem Dpt. of Agric. India: Chem. Series. 1906, I, No. I, 11. Also Journ. Chem. Soc. 1906, Abstr. II, 487.

J. B. BRUNNICH. *Fertilising Value of Rainwater.* Ann. Rpt. Dept. of Agriculture, Queensland. 1908-09 59-60. Journ. Chem. Soc. 1910. Abstr. II, 647 - Brünnich's determinations were done in Brisbane, Cairns, Kamerunga, Roma, and other parts of Queensland. (*Ed.*).

the utilisation of nitrogen is lowered; the second year this loss may be made good, although there is no increase in the utilisation of the nitrogen.

3) Treatment with straw alone has always reduced the yield, both in dry matter and in nitrogen, both in the field and in pots, during the first year, except when the straw is given in minimum quantities. In general the action of straw was more evident the smaller it was chopped. In the pot-experiments there was an after-effect the second year, but not compensating the loss in dry matter and in nitrogen during the first year.

4) The utilisation of the nitrogen of the green manure was highest when no straw was added. The results, showing the nitrogen in the straw and in the wheat harvested, were the following:

a) in heavy soil, in the field	14.0 %	1st year
	0.0 %	2nd »
» » » in pots . .	40.0 %	1st »
	0.0 %	2nd »
b) in light soil, and in pots.	40.0 %	1st »

Note the difference between the field and the pot experiments.

The second year M. Störmer treated a part of the light soil, in pots, with carbon di-sulphide, almost doubling the utilisation of nitrogen, which reached its maximum with green manure and chopped straw. He comes to the conclusion that in the decomposition of nitrogenous matter in the soil, part of the nitrogen passes into the atmosphere.He recommends the use of well-matured farm- manure only, which should be turned in like green manure in late autumn, or in early spring; and the avoidance, as much as possible of undecomposed straw.

A. MÜNTZ and E. LAINE. **On Loss of Nitrogen during Filtration of Sewage through Bacterial Beds.** (Sur les pertes d'azote au cours de l'épuration de l'eau d'égout par les lits bactériens). *C. R. de l'Acad. des Sciences,* T. 152, N. 13, pp. 822-826, Paris, 27 mars, 1911. **1140**

France

The loss of nitrogen which takes place during the filtration of sewage on bacterial beds is on an average from 50 to 60 %, sometimes 70 %. The study of this question entails researches into the causes of this loss, and the forms under which it takes place.

There is a close relation between the proportion of organic matter present in the sewage water and the loss of nitrogen. When there is no organic matter and all the nitrogen is in the form of salts of ammonia, the loss of nitrogen is little or none. The loss of free nitrogen must be attributed to the organic matter; and this elimination together with the destruction of the organic matter itself, may be compared to combustion by fire, during which in the same way carbon is eliminated as carbonic acid, and nitrogen as free nitrogen.

The greater part of the micro-organisms which destroy organic matter act in this way. But it is not only nitrifying organisms which produce sewage purification; for when they act alone they cause the nitrification of nitrogen and do not set free nitrogen gas. Considering the quantities of nitrified nitrogen and of free nitrogen formed by sewage-water in its passage over the bacterial beds, it is easy to see (from the point of view of the destruction of nitrogenous matter; which is the element of pollution most to be feared) the most effectual action is due to combustion agents, unless the nitrates formed pass through a series of successive reductions to the state of free nitrogen.

Experiments were made by adding known quantities of potassium nitrate to sewage-water in course of purifying. Any reducing action would extend to the nitrate introduced. This took place; and the results showed that notwithstanding aeration, there is a perceptible reduction of the nitrates formed. But the loss of nitrogen in this way is much less than results from the direct combustion of the organic matter and of the ammonia itself. Denitrification is all the more rapid the greater the quantity of organic matter.

In no case was the nitrogen of the nitrates used to form organic matter or ammonia. The action of the micro-organisms was therefore limited to using the oxygen of the nitric acid, without using its nitrogen. This reduction is direct and complete; for the passing through the stage of nitrites has not been verified.

1141 GYÀRFÀS. **Drill-Manuring in Hungary.** — (Weitere Erfolge der Drilldüngung in Ungarn). *Deutsche Landwritschaftliche Presse,* N. 17, pp. 193-195, Berlin, 1 März, 1911.

Hungary Experiments in manuring in lines are giving good results in Hungary. The fertiliser was spread by a drill constructed at Losonc, in Hungary, and called Record II. The following table shows the results per hectare, obtained on the Vilke property, by manuring experiments with summer barley, oats, winter-rye and winter wheat:

	Fertiliser	Total Production	Surplus compared with unmanured soil	Surplus compared with soil manured by scattering
For 1 hectare of Summer Barley.				
Manure	kg.	kg.	kg.	kg.
Unmanured	—	1392	—	—
Superphosphate, scattered	345	2038	646	—
» drilled in	115	2167	775	129
» »	182	2148	746	110
» »	230	2107	715	69
» »	390	1923	531	—
» »	345	2038	646	—
For 1 hectare of Oats.				
Unmanured	—	1508	—	—
Superphosphate, scattered,	345	1415	—	—
» drilled in	115	1725	217	310
» »	182	1702	194	287
» »	230	1587	79	172
» »	300	1599	91	184
» »	345	1541	33	126
For 1 hectare of Winter Rye.				
Unmanured	—	1185	—	—
Superphosphate, scattered,	345	1300	115	—
» drilled in	115	1408	223	108
» »	182	1631	446	331
» »	230	1610	425	310
For 1 hectare of Winter Wheat.				
Unmanured	—	1323	—	—
Superphosphate, scattered,	345	1369	43	—
» drilled in	115	1564	241	195
» »	182	1748	425	379
» »	230	1723	400	354

Phosphate Deposits in Egypt. (Report of the Brit. Chamb. of Comm. of Egypt). *The Board of Trade Journal.* —N. 746, p. 573. London, March, 1911. **1142**

Egypt

During the course of the Geological Survey of Egypt, begun in 1896, extensive phosphate deposits were discovered, ranging in colour from a light grey to a yellowish brown, and composed mainly of fossil bones, such as the vertebrae and teeth of fishes, together with coprolites and carbonate of lime. Varying quantities of silica and silicates of iron and aluminium are also present.

Nile Valley deposits. — Deposits have been discovered in the Nile valley at Sebahia, south of Esneh, and on the top of the plateau called Jebel El Qurm. The nearest point of these deposits to the railway is some 10 km. away, and it is stated that at small cost a light railway could be laid by which the phosphates could be brought down to the Nile. Samples yielding 70 per cent. of tribasic phosphate were obtained from the deposits at Sebahia. Deposits in the neighbourhood of Qena, or Keneh, extend over a length of 25 km. from the base of Jebel Serrai and the southern end of Abu Had, with an average breadth of 1 km. There are apparently large deposits of low grade phosphates here but phosphates giving up to 70 per cent. of tricalcium phosphate have not as yet been found. Very little systematic prospecting, however, has been done.

Red Sea Hills deposits. — Phosphate-bearing beds occur on the east slope of the Red Sea Hills in the Duwi Hills, and near Wadi Safaja, whence there is a good track to the sea, at a place where the water close to the shore is 13 fathoms deep. It is understood that preparations are being made to work these deposits on a large scale, and that a light railway is now being constructed. The phosphate bed also reappears a little south of Qossier, (Kosseir) but overlaid by thick strata of limestone.

Dakhla Oasis deposits. — Phosphate deposits occur throughout the Dakhla oasis, extending from the extreme west at Qasr Dakhla to the extreme east at Tenid, a distance of over 50 km. The average thickness of the bed is between 2 and 3 metres. Throughout the desert margin, bordering the cultivated lands at Qasr Dakhla, Birbaya, Rashida and Hindan, these beds could be worked with great facility.

It would appear that the average of the out-cropping rock in the Egyptian phosphate deposits contains between 40 and 50 per cent. of tricalcium phosphate, but occasional samples have returned up to over 70 per cent. Localities which are being carefully worked over give promise of producing considerable quantities of rock averaging over 60 per cent of phosphate.

1148 J. GRANDVOINNET. **Experiments with Potassic Fertilisers in France.** — (Essais d'engrais potassiques en 1910 dans le Département de l'Ain). *Journal d'Agric. pratique,* N. 11, pp. 337-338. Paris, 16 mars, 1911.

France Experiments with potassic fertilisers were carried out, in 1910, in the Department of the Ain, in 30 fields with different crops, but principally with potatoes and maize, as required by the Paris Bureau for the Study of Fertilisers. The results obtained with potatoes were all good, although the damp season induced rot. It may be said that in fields manured with potassium sulphate the damage caused by rot was reduced from 30 or 40% to 10%. The average return for an outlay of about 30 frs. on fertilisers was from 100 to 200 frs.

Although the year was very unfavourable to maize, the net return for an outlay of 50 frs. on potassium sulphate was 70 frs.

In an experiment with wheat it was found that the potassium sulphate had raised the weight of the hectolitre from 75 kg. to 78.50 kg.: equivalent to an increase in market value of 75 centimes per quintal.

In vineyards, potassic fertilisers induced a better ripening (*aoûtement*) of the wood. Thus, notwithstanding the exceptionally damp and unfavourable season of 1910, the vintage results were satisfactory.

A. BAUMANN. **Liming and Lime Fertilisers in Peat Soils.** (Kulturversuche auf den Versuchsfeldern der k. Moorkulturanstalt, Moorkulturstation Bernau. Kalkung und Kalkdüngung im Hochmoor.). *Landw. Jahrb. für Bayern,* 1 J. N. 3. pp. 154-160. Munchen, 1911. **1144**

Germany

The writer recalls preceding researches, according to which what is called the humic acidity of peat-moss depends on the absorbing power of the cellular membranes of the mosses forming the peat: a power exerted not only on alkaline substances, but also on acids. This generally occurs in peats and in clays poor in nutritive matter.

From his own experiments, Mr. Baumann would infer that liming peat-land in high proportions (2000 kg. and more of lime per hect.) is a great mistake: 1st because of the expense; 2nd because lime entails a series of difficulties, both in South and North Germany.

Mr. Baumann therefore recommends the following rules for bringing peat moss under culture:

1) Avoid all liming, especially with quick lime. The application of 1000 kg. per hectare does no harm, but is generally useless.

2) Liberally apply phosphatic and potassic manures during the first year. The phosphatic fertilisers should be rich in lime: mineral phosphates containing about 20 % of phosphoric acid and consequently 250 to 300 kg. of phosphoric anhydride per hect., and 500 to 600 kg. of lime. The potassic manure should consist of concentrated salts (salts at 40 %, or potassium sulphate and magnesium at 29 %), or of potassic mixtures containing no free acid.

3) When possible, crop with potatoes the first two years, in order to cause rapid decomposition in the soil.

1145 E. CHANCRIN AND A. DESRIOT. **Sulphur as Fertilizer for Potatoes and Beet**. (Action du Soufre comme engrais sur le développement des Pommes de terre et des Betteraves). *Journ. d'Agr. pratique N.* 14, pp. 427-429. Paris, 6 avril, 1911.

France Having noticed that potatoes treated with sulphur for " Galle " gave a very abundant crop, the writers made experiments to ascertain whether the good crop was due merely to absence of disease, or to the direct action of sulphur on the tubers. The results obtained at the School of Gennetines (Allier) France, are given in the following table, the figures representing the weight of crops in kilograms per hectare:

Plots.	Potatoes: Kgr. per hectare Without sulphur.	250 kg. sulphur.	500 kg. su'phur.
1, 5, 9, Unmanured	10 000	10 580	10 810
2, 6, 10, Superphosphate	12 400	12 450	12 520
3, 7, 11, Superph. & potassium sulph. . .	12 700	12 962	13 444
4, 8, 12, Superph., potass. sulph., sodium nitrate	13 060	14 338	16 036

The variety of potato was *Eléphant.*

The same experiments were made with beets, *Jaune ovoïde des Barres* and *Jaune géante de Vauriac.* The results obtained at Gennetines were the following:

Plots.	Beets: Kgr. per hectare Without sulphur.	250 kg. sulphur.	500 kg. sulphur.
1, 5, 9, Unmanured	25 500	26 050	27 250
2, 6, 10, Superphoshate	30 010	32 100	35 000
3, 7, 11, Superph. potassium sulph.	33 037	35 250	38 694
4, 8, 12, Superph., potass. sulph., sodium nitrate	45 805	47 018	49 990

All the plots treated with sulphur produced a higher yield. The same experiments carried out at the School of Beaume (Côte d'Or) France, gave results pointing the same way.

Without giving a definite explanation of the action of sulphur, the writers think that its effects are of the same kind as those obtained in sterilising the soil by heat, by carbon disulphide or boric acid. In any case, these experiments of one year only are worth repeating, as the result might be of practical value.

Field Crops. — Industrial Crops. — Horticulture. Arboriculture.

O. MANETTI. **Eritrea Food Grains.** (Ricerche analitiche sulle cariossidi dei cereali eritrei). *L'Agricoltura Coloniale* — V. anno, N. 3, pp. 100-113, Firenze, 31, Marzo 1911. **1146**

Eritrea

The food grains examined were: « Dura » *Sorghum vulgare* Pers., *Andropogon Sorghum* Brot; « Dagussa » *Eleusine coracana* Gaertn., *Eleusine tocussa* Fres, *Eleusine aegyptiaca* Dest.; « Taff » *Eragrostis abyssinica*, Lk.; « Bultuc » *Pennisetum spicatum*, Kolan, *Pennisetum tiphoideum*, Rich.

The first two are natives of India, where they are still found to a considerable extent, while the others are indigenous to Abyssinia (1).

The « dura » is cultivated over large regions of Eritrea at different altitudes, from sea level to 2309 m., the yield being very irregular. It is nearly always cultivated for food, being little used as fodder.

Dagussa is cultivated for the manufacture of beer; Dr J. Baldrati reports that its starch content is as much as 80 %, which ranks it among the best cereals for the starch factory and the distillery.

Taff is cultivated at altitudes above 400 m., and yields as much as 100 times the seed. Its cultivation is similar to that of barley. It is used for food, and the straw as fodder for cattle.

Bultuc is less cultivated; the flour is employed in the preparation of a porridge and for the manufacture of beer; the grains are used in the starch factory and in the distillery.

Colour of the grain. The colour of the grain in some samples of dura varied from wine red to grayish white. The varieties studied were very much mixed; the purest were the « uarda », with white grains, and the « uot ferat », with red grains; the dura of the Baza was a mixture, in about equal parts, of red and white.

The four types of dagussa examined were genuine mixtures of three known varieties, brown, red and white.

The « fengel » type was mainly formed of brown grains and so was one of the types of « gobezé ».

Four samples of taff examined were a mixture of red and white grains; the « uaffe » contained 67 % of red grains while the « gezenê » and the « scimase » were on the contrary formed respectively of 88 and 96 % of white grains and the « cengher » had an equal mixture of red and white.

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(1) Compare, A. H. CHURCH, *Food Grains of India.* 1886 and GEO. WATT, *Dict. of the Economic Products of India.* (*Ed.*).

Bultuc is yellowish, verging towards a brownish green.

Dimensions of the grains:

Dura	4.20 - 4.80 mm. long 2.70 - 2.90 mm. wide
Bultuc	3.10 - 3.90 mm. long 1.60 - 2.00 mm. wide
Dagussa	2.20 - 2.60 mm. long 1.35 - 1.80 mm. wide
Taff.	1.40 - 2.00 mm. long 0.85 - 1.00 mm. wide

Volume, weight, density. — The results given below represent the average of several weighings:

GRAINS	Average Weight of 100 grains	Weight of 1 hectol.	Volume, of 1 quintal average
	gr.	kg.	Hl.
Dura	2.512	77-78	1.320
Dagussa	0.200	82-83	1.210
Taff.	0.033	88	1.125
Bultuc.	0.690	79	1.260

The following table gives the composition of these Eritrean grains:

GRAINS	Proteids	Fibre	Fatty Matters	Starch etc.	Nutritive ratio
Dura	9.17	0.40	4.45	46.60	6.40
Dagussa	4.24	0.37	0.83	55.52	13.57
Taff	11.70	0.25	2.32	48.49	4.62
Bultuc	8.25	0.22	2.79	50.36	6.90

It would be interesting to experiment on the value of dagussa for starch factories and breweries, as well as the bread-making qualities of dura and taff.

White and Yellow Maize in Rhodesia. — *The Rhodesia Agricultural Journal*, Salisbury, Febr. 1911, pp. 404-406. **1147**

Rhodesia

In order to obtain definite information as to whether white or yellow maize is more profitable for export, four samples of Rhodesian maize were recently forwarded for examination and report to the London Corn Exchange, as well as to the most prominent corn dealers in England. In all cases the maize was reported to be of excellent quality and the samples were placed in the following order·

Choice Hickory King or *Large Flat White* commanding a premium of about 6 d. per quarter (480 lbs) over any of the others. *F. A. Q. Hickory* and *Choice Boone County* of about equal value and yellow maize about equal in value to *F. A. Q. Hickory* or *Boone County*, but on some markets worth 3 d. to 6 d. per quarter less.

Messrs. Fear, Colebrook & Co. of Southampton write: « If there were a very large import of the white flat maize and a comparatively small import of the yellow flat maize the latter would command *quite as good a price as the former;* but with such a small general import as we usually have from South Africa we think the white would as a rule be worth more than the yellow ».

According to Messrs. John Jackson & Co. of Glasgow: « For export purposes we suggest that the Rhodesian farmer will certainly obtain better results by growing white maize. The reason for this is that the supplies of white maize available for the United Kingdom and the Continental markets are limited to certain parts of the United States of America, South Africa, the Argentine, the Danubian provinces and South Russia, so that the competition in it is certain at all times to be more intense. Of course the value of white maize will be governed more or less by the value of yellow, but for certain purposes white maize will bring a substantial premium. South African and Rhodesian maize are eminently suited for the commercial requirements of Great Britain and it is all a matter of price. The Rhodesian grower will require to compete with other maize growing countries, but he certainly has an advantage in his quality being of a higher standard than the maize from the United States of America and, as we have said, for certain purposes, to that from South Russia, the Danubian Provinces and the Argentine; and judging by the size and colour of the berry he is extremely fortunate in the climate and the soil ».

It thus appears that the English trade is expecting better prices to be realised for white than yellow maize, and the use of white maize for manufacturing purposes is being extended and will thereby bring about an increased demand.

As regards production, it was shown in certain experiments carried out by the Mississippi Experiment Station in seven different States that when 217 white varieties were grown in comparative trials with 273 yellow, the advantage in yield of the former was at the rate of about two and a half bushels or 150 lbs. per acre. On referring to the variety trials carried out at the Government Experiment Farm, Potchefstroom, Transvaal, and extending over several seasons, it will be seen that of the ten heaviest croppers, five are white varieties and five yellow. It would therefore appear that there is little or no difference between the average cropping powers of yellow and white maize, provided that they are grown under equally favourable conditions.

1148 T. BENINI. (From Mansoura) **Rice and the Salt Soils of Egypt.** (Culture egiziane, il riso). — *L'Agricoltura Coloniale*, anno V, pp. 19-22, Firenze, Gennaio, 1911.

Egypt The cultivation of rice is one of the means adopted in Egypt in controlling salt in soils. This culture is begun in April and finished at the end of November. Five or six varieties of rice are used, according to the saline conditions of the soil.

The saltest soils, when first put under cultivation, are adapted for the coarser and later varieties of rice, to be sown not later than April 15th.

The *Panicum aquaticum* often precedes the rice, but it is generally better to well leach the soil in Autumn. The « barari » (abandoned) lands should be first improved and levelled. When it is desired to obtain the maximum leaching effect the ground is formed into fields, 25 m. by 100 m. surrounded by ditches, where the infiltration water drains off to the nearest canal.

After the embankments in the rice-fields have been strengthened to prevent any leakage, the soil should be levelled with the «lawate» harrow, so that the water should lie equally all over the field.

During the first period of vegetation the water should be frequently renewed., This is necessary in strongly saline soils, and delay may cause considerable damage to the rice, a crop that on saline soils requires abundance of water and great care on the part of the farmer. Rice-diseases are less harmful than elsewhere when the soil is saline.

The yield varies from 15 to 60 quintals of paddy. Paddy is sold at the field per hectare by the « daribe » of 945 kg.

H. PAUL. **Forage Plants Manuring Experiments.** (Kulturversuche auf den Versuchsfeldern der K. Moorkulturanstalt. Moorkulturstation Bernau, Wiesen und Weiden in Hochmoor). — *Jahrbuch Landw. für Bayern*, 1 Jahrgang, N. 3, pp. 168-176, München, 1911. **1149**

Germany

The following results were obtained from the manuring of pure cultivations of forage plants with 30 kg. of nitrate of sodium in a peaty soil:

	Crop per hectare				Extra crop per hect. with nitrogen	
	Green		Dry			
	With nitrogen	Without nitrogen	With nitrogen	Without nitrogen	Green	Dry
	Kg.	Kg.	Kg.	Kg.	Kg.	Kg.
Agrostis alba	11 400	9 000	4 389	2 537	2 400	1 852
Anthoxanthum odoratum .	5 200	2 600	1 776	888	2 600	888
Festuca arundinacea . . .	7 300	4 600	—	—	2 700	—
Festuca pratensis. . . .	6 100	2 800	—	—	3 300	—
Festuca rubra	7 400	2 600	2 890	1 097	4 800	1 793
Festuca ovina	7 400	2 800	2 760	1 120	4 600	1 640
Phleum pratense	11 400	5 800	3 775	2 102	5 600	1 673
Glyceria fluitans	4 500	2 700	1 397	798	1 800	599
Phalaris arundinacea . .	9 500	5 000	3 179	1 651	4 500	1 528
Holcus lanatus	6 200	3 400	1 550	788	2 800	762
Aira flexuosa	9 100	5 000	2 962	1 893	4 100	1 069
Poa nemoralis	10 500	6 000	4 075	2 411	4 500	1 664
Poa pratensis	7 700	5 100	2 785	1 975	2 600	810

The results obtained in meadows with the different manures show their influence on the quality of the crop:

	Farm manure		Horse manure		Sheep manure		Artificial Fertilisers	
	1st cut	2nd cut	1st cut	2nd cut	1st cut	2nd cut	1st cut	2nd cut
Grasses (per cent). . .	78.8	57.2	93.3	78.4	82.8	72.0	93.1	81.1
Leguminous Plants (per cent)	15.2	31.2	3.2	13.8	9.4	19.9	3.2	6.8
Total Hay Crop Kgr. per hectare	3 430	2 680	3 160	2 580	2 895	2 555	3 790	2 065

Each field received per hectare 10 000 kg. of farm manure, and the deficiency in phosphoric acid and potash was made up by 60 or 120 kg. of chalky calcium phosphate (*Kreide Phosphat*) and salts of potash. Field 98 received only phosphates and salts of potash, and as nitrogen fertiliser, nitrate of soda corresponding to 20 kg. nitrogen per hectare.

1150 **The *Chloris Gayana* or Rhodes Grass in Sicily**. *Boll. R. Orto Botanico e Giardino Coloniale* di Palermo. Anno IX, N. 4, pp. 192-193.

Italy: Sicily

The *Chloris Gayana* is a perennial grass which resembles *Cynodon Dactylon* and spreads very rapidly by its long stolons. Its main quality is resistance to drought, so that it is one of the best fodder plants for summer in dry hot regions. In spite of drought it keeps its green colour much longer than any other grass and as soon as the rain falls it begins to throw out vigorous shoots.

This plant, which is known in the Transvaal under the name of Rhodes grass, is found throughout the whole of Central and South Africa, from Senegal to Eritrea and Cape Colony; it has been successfully introduced into Australia and recently into Algeria.

Experiments in the Colonial Garden of Palermo have demonstrated its adaptability to the climate of Sicily, where it may be recommended as a summer fodder plant (1).

1151 TRABUT. **Turkestan Lucerne in Algeria.** *Journal d'Agriculture pratique*, N. 12, pp. 375-376. Paris, Mars 23, 1911.

Algeria

Mr. Trabut, who has been making experiments with the Turkestan Lucerne since 1900 at the Botanical Station of Algiers, (2) does not think it desirable for the moment to substitute this lucerne of extreme climates for the lucernes which have been acclimatised in various countries, and especially in the temperate zones. It would be more interesting to undertake a methodical and connected study of the innumerable forms of *Medicago sativa*; for each region, there is a kind which is more particularly adapted to it, and it is a mistake to think that the same varieties would give the best yields anywhere. It is necessary to select, according to the climate and soil, the variety capable of giving the best results and the maximum profit. Each farm should select by planting the lucerne in spaced rows, and by only keeping for seed the plants which are most developed, the shoots of which may be used as slips in order to fix the variety.

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(1) For experiments made in New Zealand, see this *Bulletin*, November, 1910, p. 58.

(2) See this *Bull.* Feb. 1911, N. 445, and March, 1911, N. 811. (*Ed.*)

1152

P. LIEBAU. **Comparative Experiments with Red Clovers of different Origin.** (Anbauversuche mit Rotklee verschiedener Herkunft). — *Illustrierte Landw. Zeitung*, 31 J., Nos. 24-25, pp. 233-234, and 246-247. Berlin, 25-29 März 1911.

Germany

The following are the results of experiments with *Trifolium pratense* made at the High Agricultural School of Berlin. The clovers were on triple plots, in 1906-7 and 1908-10.

Origin	Total crop of dry substance, qs. per hectare and per cent of the total crop of 1909 and 1910 produced in the first and second year respectively.					
	1906	1909 and 1910'	1909-1910			
Silesia . . .	46.07	138 93	1st year	46 %.	2nd year	54 %
Styria . . .	48.26	138.09	»	44	»	56
France . . .	49.08	106.35	»	43	»	57
England . . .	51.52	103.01	»	41.5	»	58.5
Bohemia . . .	47.62	121.03	»	43	»	57
Hungary. . .	47.45	127.76	»	44.5	»	55.5
Galicia . . .	46.39	134.52	»	44	»	56
Russia . . .	44.62	131.58	»	39.5	»	60.5
Livonia . . .	—	140.03	»	42.7	»	57.3

The crop is seen to be considerably superior in the second year.

1153

D. M. DONALD. **Accidental Introduction into Australia of *Trifolium fragiferum* and of *Paspalum ovatum*, two Useful Plants** *Gardeners' Chronicle* March 4th, 1911, p. 139. London

Australia Victoria

The « Strawberry Clover » (*Trifolium fragiferum*) was introduced accidentally into Victoria from Ireland.

Having been used as packing material, it was subsequently thrown out into a farmyard belonging to the Hon. Mr. Irving.

Soon after, a plant of this clover (hitherto unknown in the country) appeared on the spot, and as the species proved more drought-resisting than other clovers, it was perpetuated, and is now, the writer believes, cultivated extensively throughout Victoria (1).

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(1) *Trifolium fragiferum* grows spontaneously in Italy. G. ARCANGELI *Flora Italiana*, Torino, 1894, p. 498. (*Ed.*).

The introduction of *Paspalum ovatum* into New South Wales was on somewhat similar lines. In 1890, a packet of the seed of this grass was sent thither from Victoria, in the hope that it would succeed better under the subtropical conditions prevailing there.

Mr. E. Seccombe of Wollongbar sowed about ½ oz. of the seed, and in 1891, said he did not think much of it. In 1892 however, he sent a specimen of grass to be identified, stating that he found it stood drought exceptionally well. The plant proved to be *Paspalum ovatum*, which sold, a year after, at £ 1 per lb., owing to its wonderful properties as a forage grass.

1154 G. Josa. **Experiments with Vetch Varieties in Molise (Southern Italy).** (Le varietà di veccia da foraggio e il commercio del seme). — *Giorn. di Agric. della Domenica*, Anno XXI, N. 23, p. 18. 1 fig. Piacenza, 26 Marzo, 1911.

Italy: Molise

The cultivation of vetches for fodder has developed considerably in Italy, there being several varieties for autumn and spring sowing, adapted to different local conditions. The following are the results of comparative experiments with different Italian varieties:

Varieties of vetch	Crop calculated as hay per hectare
White	28 qs.
Black Piacenza	39 »
Modena	42 »
Black Ravenna	48 »
Gray Ravenna	57 »
Abruzzi (Roccaraso)	35 »
With greenish seed	23 »

There would thus be a difference in the production of hay varying from 7 to 29 qs. per hectare, according to the variety sown and this without considering the last variety.

Farmers should prefer seed produced in their own or in neighbouring farms. In trade the different varieties and origins of vetch seed should be distinguished.

Abruzzi vetch was severely attacked by *Septoria Viciae* Sept. (1).

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(1) *Septoria* (family of *Sphaerodiacae*) are a numerous group of imperfect fungi often living as parasites on spots on leaves, but seldom causing serious damage. (Cfr. Delacroix and Maublanc. *Maladies parasitaires des plantes cultivées*, p. 392, Paris, J. B. Baillière & Fils). (*Ed*).

W. M. Esten. **Maize Silage in Connecticut.** — *The Connecticut Farmer*. New Haven, Conn. March. 11, 1911. 1155

United States: Connecticut

The importance of silage is recognized by farmers in general and dairymen in particular. In Connecticut more maize is raised for the silo than for other purposes. The siloing develops in the maize flavours and aromas which are much relished by cattle. The term maize, or corn, means here the whole maize plant with the ears included. The conditions for fermentation of maize into silage are four: A sufficient temperature, exclusion of air, sugar, and sugar fermenting organisms.

In the lower part of the stalk the amount of sugar in maize. is from 1 to 1 ½ per cent. Very soon after filling a silo an increase of temperature is noticed. The cause of this is not definitely understood. Some would place the cause in the residual activity of the living cells, others in the activities of micro-organisms.

The exclusion of air is necessary for the acid-bacteria to prevail. Where air is present the fermentation is alkaline, and the acid-bacteria seem to play no part in the fermentation. The fermentation of silage takes from 4 to 10 days, in which time most of the acid is produced (1).

After this period there is a very slow acid accumulation for several weeks. In every silage the sugar entirely disappears. The list of acids found in silage is a long one, and illustrates the complexity of the fermentation and ripening processes.

During the warmest part of the year silage spoils very rapidly where it comes in contact with air. Spoiled silage is a dangerous food. Besides tainting the milk and upsetting the digestion of the cow, it often becomes poisonous. To avoid this, it is necessary to feed off each day from 1 ½ to 2 inches. If this is done the silage has no time to change or ferment much.

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(1) Whether sour silage or sweet silage results from the operation is determined mainly by the temperature at which fermentation takes place within the mass of herbage. Silage is sour or sweet according to the presence or absence of acid, chiefly acetic acid. When " sweet " silage is produced it is due to the higher temperature having killed the living organisms which, under conditions of less heat, set up an acid fermentation. W. Fream. *Elements of Agriculture*, London, 1910.

For the fermenting organisms that act in ensilage and for the conditions that favour their activity, see: F. Lafar, *Technischen Mykologie*, Jena, 1908, vol. II, p, 332. *(Ed.)*.

The tall narrow silo is better than the broad low one. The loss is much less.

If the herd be large enough, two silos of different diameters are of great economic convenience, the large one being used for winter feed and the small one for summer. Another advantage is in filling. One will be settling while the other is being filled.

A round wooden-stave silo is the best and can be made to last as long as a wooden building, by soaking the wood in some preservative, by applying asphalt or tar to the bottom, and to the staves to the height of a few feet, and by keeping the outside surface well painted.

The best wooas for a silo are western red cedar and western fir. A silo 18 feet in diameter will feed 42 animals. The maize which will contain the most nutriment per acre is the one to grow for silage purposes. Taking two extremes, the *Leaming* variety grows a high percentage of grain on the cob, while the *Eureka* grows a high stalk full of leaves but very little grain.

The maturity of the maize presents one of the most important factors connected with silage. This one factor alone will determine whether there will be one third of it lost in the silo or only $^1/_{20}$.th Immature maize has more juice, which is easily pressed out and runs away from the silo: a complete loss. Furthermore, immature maize has more sugar which has to be entirely turned to acid, and a very sour silage is the result. Some of the proteins are also changed to undesirable compounds, which do not appear in matnre maize.

On the other hand, matured maize has gained in total nutriments, of a more stable nature, less likely to be broken down by fermenting agencies.

If maize does not blossom in Connecticut by the 20th of July, it will not be likely to develop completely. The period in which maize will grow in Connecticut is not much over 120 days, between May 20th and September 20th.

Inoculation with pure cultures of acid-bacteria showed that silage could be made in 24 hours. About 3-000 tons of maize were treated by inoculation, producing silage without any disagreable odour, and with a saving of three to four weeks.

1156

« Cotton Famine » in European Iudustry relatively to the general Increase of Cotton Production. (Die Baumwollefrage, Denkschrift über Produktion und Verbrauch von Baumwolle. Massnahmen gegen die Baumwollnot). — *Veroffentlichungen des Reichskolonialamtes*, N. 1, pp. VIII + 341, Jena, 1911.

German Colonies

Insufficient cotton production, while the requirements of the cotton industry increase, produces in Europe what is called the « Cotton Famine ». There is some danger that eventually the cotton industry should leave Europe to pass to those countries where the raw material is produced.

If all the inhabitants of the globe were to wear cotton, 42 000 000 bales of cotton would be required. Meanwhile the world's total cotton demand for the year 1909-1910 is estimated at 17 030 511 bales, while the actual total production varies from 15 000 000 to 19 000 000 bales, distributed as follows:

United States	59.8 %
British India	21.8 »
Egypt	5.5 »
Russia	4.3 »
China	3.6 »
Brazil	2.2 »
Other countries	3.0 »

The industrial development is meanwhile growing apace out of Europe.

The increase of spindles, from 1890 to 1910, was 91.8 % in the United States and 79.4 % in British India, while it was only 54.6 % in Europe.

It becomes therefore very important to find out what are the productive capacities of all the different cotton centres of the world, and to stimulate cotton production in all those countries where cotton con be grown.

It is useless to expect the present production centres to improve the future conditions of the European cotton industry. Without speaking of the United States, any future increase in Asia would always be largely absorbed by the markets there. In the same way, Russia would absorb its own production in Central Asia, where the institution of numerous experimental stations and other measures taken by the Russian Ministry of Agriculture are developing the cotton industry. In South America also, even if the difficulties of hand labour and capital could be surmounted, the increase of production would be absorbed by the local demand. The same may be said for Australia, in proportion as the soil and climate may allow the extension of cotton planting.

For the use of the cotton industry in Europe there remains only Africa, where Egypt alone up to the present has an important place in the world's cotton market. But the production of Egypt is restricted to an irrigated centre, and limited by the continuous increase in the value of the soil, which will cause the substitution of more intensive cultivations than that of cotton. The whole remainder of Africa must be looked upon for the future as the principal Colonial territory that can furnish cotton to the European industrial states. These states are making every effort to introduce and develop cotton cultivation in the regions most suited, in order to remedy the pressing scarcity of raw material from which their textile industries are suffering. At the same time, each European nation is taking every commercial or political step possible for securing the cotton production of its Colonies as a national industry.

Thus Germany is taking the proper measures for continuously developing the cotton cultivation in her Colonies, not only in the interest of her industries, but also in the interest of the working and middle classes.

In German East Africa, the Indian cotton (*Gossypium herbaceum*) has been introduced, and in the interior the Peruvian cotton (*G. peruvianum*). At Togo the Sea-Island cotton (*G. Barbadense*) and also a hybrid between the Sea Island and Peruvian. In Kamerun there have been for a long time several kinds of cotton, introduced probably by Arab influence. In South-West Africa, in Amboland, there are a few plantations, probably due to missionaries.

Since 1903 some plantations of Egyptian cotton have been made in German East Africa, with excellent results; but the cotton there is liable to various diseases, owing to the fact that the seed bought in Egypt has to adapt itself to totally new conditions. Hence the establishment of the Cotton Station of Mpanganya in German East Africa for the production of local seed. The Egyptian varieties succeeded best; then came the American Upland (*G. hirsutum*); while the Caravonica failed entirely. The cultivation is still carried on chiefly by natives, for whose benefit the Cotton School at Mpanganya has been created and a fixed wage guaranteed. The large plantations were much developed in 1908. At present there are 12 Companies with 85 000 hectares. There are also 3500 hectares cultivated in European plantations of less importance. In Togo, cotton production is much in the hands of the natives, who require the tactful treatment which is only possible when they are understood. In German South-West Africa and in Kamerun, little has been done for cotton production, and not much remains to be done in the German territories of the Pacific.

Generally speaking, it may be said that the German Colonies offer favourable conditions for the cultivation of cotton ; in certain regions the conditions are even excellent. One of the greatest difficulties is that due to the periods of drought, especially in East Africa and in Togo; but artificial irrigation is possible in the former. It is generally advisable that the small native cultivations should be allowed to develop side by side with the large European plantations, which should be directed according to the rules of modern agriculture. The substitution of the plough for the spade, together with the extension of railways, will largely contribute to the economical development in tropical Africa.

It is desirable that special experimental stations should be organised by the State in the German African Colonies. Those stations should attend to:

The choice and cultivation of cotton varieties adapted to the different conditions of the soil and climate, special attention being given to the earliness of the varieties, their resistance to disease, the quality and quantity of the crops and of seed production.

The determination of suitable methods of cultivation, tillage of the soil by hand and by animal traction. Irrigation and fertiliser experiments. Determination of the best rotations and subsidiary cultivations. The study and control of parasites. Agricultural training of planters and natives.

These are the objects provided for by the Convention of March 14th, 1910 between the German Imperial Colonial Office and the Colonial Economic Committee. The effect will be to extend cotton cultivation experiments and increase the available resources, for investigating and improving all the conditions connected with the production of cotton, the Colonial Administration having thus to organise a State Experimental Administration.

By the afore-mentioned Convention, the Imperial Colonial Office is connected with the Organisation of the Colonial Economic Committee in Germany and with its proper representatives in the Colonies, in order that the work may proceed in a uniform and disciplined manner.

The German nation has a general interest, as have all other industrial nations, in encouraging the cultivation of cotton in the Colonies ; and this is why State aid is necessary in addition to private efforts. The following is a comparison of the expenditure made for cotton experiments and of the results obtained in Africa by Great Britain, Germany and France:

	Expenditure for experiments up to 1909	Cotton production
	£	£
Great Britain . . .	470 000	1 005 000
Germany . . .	85 000	215 000
France	45 000	45 000

These figures show that the money expended by England has already given satisfactory results.

The publication of the *Reichkolonialamt* on the Cotton Question gives useful bibliographical indications at the end of each chapter. In Appendix are some special reports on the causes of the "Cotton Famine", and on Cotton production in North America and in other countries.

1157 C. TROPEA. **Cotton Cultivation in Italy.** (Sulla possibilità di estendere le colture cotoniere in Italia). *Bollettino del R. Orto Botanico e Giardino Coloniale di Palermo*, Anno IX, N. 4, pp. 169-179.

Italy: Sicily Sardinia

The present condition of the market tends to encourage cotton cultivation in Italy. In Sicily there used to be thousands of hectares of cotton plantations; but American competition greatly reduced this culture in Sicily, where the small area now under cotton is cultivated with very primitive methods.

Cotton could be grown in Sicily on two extensive plains, one irrigated, that of Catania, and the other dry, that of Terranuova. If these two regions were to resume the cultivation of cotton, adopting modern methods, the quantity of cotton necessary for Italian industry would be assured.

Without counting Sicily and Sardinia, where it is now admitted that cotton gives a satisfactory yield, it will be as well to study what other parts of Italy might be utilised for this cultivation.

Mr. Tropea has made a comparison between the climates of Bulgaria and Italy. He gives tables of the average monthly temperature and of the rainfall at the Agronomic Station of Sadovo, which show that the greater part of Italy has an average temperature superior to that of Bulgaria, and that the rainfall is also more abundant.

Italian climatic conditions are therefore more suitable for cotton production than Bulgarian, where cotton is cultivated over very extensive areas, and where a still greater extension is predicted. The lands bordering the Mediterranean could grow especially those cotton varieties that flourish under similar climatic conditions in Bulgaria and Turkestan.

Cotton Cultivation in Tunis. (La culture du Cotonnier en Tunisie) *La Dépêche Tunisienne*, XXIII année, N. 7491, Tunis, mars 2, 1911. **1158**

Tunis

The Research Section of the Agricultural Association of Tunis, at its meeting on March 1st, examined the question of Cotton growing in Tunis.

Mr. Barrion reported that the first attempts had been very encouraging. Some planters also spoke of the good results obtained. Mr. Gounot pointed out how prosperous this cultivation is near Bizerta, where the natives have grown cotton from time immemorial Seeds of different varieties of cotton will be distributed throughout the country,

G. C. DUDGEON. **Assil Cotton in Egypt.** *Nature*, vol. 86, London. March 30, 1911, pag. 144. **1159**

Egypt

Mr. G. C. Dudgeon, General Director of the Agricultural Department in Cairo, in a letter to the Editor of *Nature*, writes: A form of cotton has been produced by selection in the field from superior growths of Mit Afifi, which is said to be a pure strain and similar to the Mit Afifi of twenty years ago. This form is known by the name of « Assil, » meaning « of pure original strain »

In order to prevent all mistakes, and that the new variety may not be confounded with the existing impure Mit Afifi, it is recommended that the former be for the present referred to as « Assil Afifi ».

Substitutes for Cotton. (Plantes capables de produire des succédanés du Coton). — *La Quinzaine Coloniale*, N. 7, p. 239, 10 Avril 1911. Paris. **1160**

German Colonies

At the meeting of the *Kolonial-Wirtschaftliches Komitee* of Berlin, Mr. Hulfeld advised that measures be taken to promote the cultivation of certain plants capable of affording substitutes for cotton (*Kapok* and *Calotropis*) (1) :

Fibre plants should be systematically collected and studied and tried in experimental fields. Publications on fibre plants should be distributed and encouragement given to the cultivation of these plants and the testing of their fibres.

1161 **Irish Flax growing Industry.** (Minutes of Evidence, Appendices and Index; Report) *Dep. of Agric. and Techn. Instruction for Ireland*, pp. XII + 505, 23, Dublin, 1911.

United Kingdom: Ireland

The following is a summary of the chief conclusions and recommendations of the Irish Committee on Flax culture:

1) The area planted in flax in Ireland has been gradually decreasing for several decades. Twelve years ago it reached the minimum, but since that period there has been a slight increase.

2) The extent of the areas planted in flax has always fluctuated considerably so that statistics on the crops are of little use in drawing conclusions as to the future of this cultivation.

3) The following considerations would suggest that the cultivation of flax may be extended and continued in certain districts:

a) In Ulster, which was the centre of the industry, the decrease is less marked than in the other provinces.

b) In other countries, there has been a simultaneous decrease in the area under flax. At present flax fibre is rare, a fact which will undoubtedly cause an increase in the cultivation of flax in the various parts of the world.

c) Irish flax possesses in a special degree the qualities of strength and fitness for spinning, which make it nearly indispensable in certain branches of the Irish spinning industry.

d) There will probably be an increased demand for Irish flaxes if the price of cotton keeps as high as it has been of late.

4) While there have been several causes for the decline in the cultivation of flax, the most striking is the speculative character of the crops due to the uncertainty in prices and production.

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(1) *Calotropis gigantea*, or *Asclepias gigantea*. An Asclepiad cultivated in the East Indies, extensively in Equatorial Africa, besides being cultivated in Egypt, where it is known under the name of "Aschur". The woody bark furnishes a long, fine, silky tow which is not very strong and is used for stuffing cushions and for manufacturing sewing and weaving thread as well as fine stuffs.

HEUZÉ, *Les plantes industrielles*, p. 208, Paris 1893. (*Ed.*).

5) Irish flax has an intermediate position between that of Courtrai, which is ranked highest, and that of Russia, which is lowest.

6) In regard to the uncertainty of the yields, it seems that success in the cultivation of flax is due rather to the adaptation to the soil, to the seasons, and the quality of the seed than to the application of fertilisers.

7) The quality of the seed influences greatly the success of the cultivation. There are great differences between the different stocks of seeds which come from Russia and Holland. It is often doubtful whether the seeds thus imported have been specially selected for the production of fibres of a superior quality, the object for which flax is cultivated in Ireland

8) The opinion that the Riga flax-seed is suitable for light soils and the Dutch seed for heavy soils, is not borne out by experiments made by the Irish Department of Agriculture, nor has it been justified by the experience of the best farmers.

9) The Irish Department of Agriculture ought to undertake experiments on a large scale to find out whether better seeds can be produced from the Irish plantations than those which come from abroad, adopting a similar method of selection to that employed successfully for cereals.

10) The quality and the product of fibre is greatly influenced by the method of retting used. The great variability in the character of the ponds and the quality of the water in which the flax is steeped increases the difficulty of ensuring uniform results.

11) The Irish Department of Agriculture ought to undertake investigations for the solution of the retting problem.

12) Although it is possible to find a river, lake or canal in Ireland where the flax could be properly and uniformly retted, the great difficulty of drying and the lack of middlemen to buy the standing crop are serious obstacles to the adoption of the Courtrai system of retting.

13) If a syndicate were to be formed for the purpose of buying and retting the flax according to the Courtrai system or some other good artificial method, the Department of Agriculture, without accepting financial responsibility would be ready to give advice and technical instruction on the cultivation and drying of flax.

14) There is undoubtedly still some progress to be made in tilling; but it may be said to be well done in Ireland on the whole. Bad retting and a want of care in the other operations carried out before the plants are consigned to the factory are to a

great extent the cause of the numerous defects generally attributed to the tilling.

15) There is no evidence to confirm the frequently expressed opinion that the decrease in the cultivation of flax should be attributed to a perceptible change in the climate in Ireland.

16) The emptying of the water which has been used for retting flax, into the rivers and small watercourses causes great damage to fish, especially by the destruction of fry.

17) In cases where the water cannot be run on the fields to be absorbed, the difficulty might be solved by means of evacuation dams.

18) The Irish Department of Agriculture ought to make experiments in the method of evacuating, purifying and chemically treating the flax water, and studying the action of this water in various dilutions on the life of fish.

19) Consecutive experiments on the cultivation, manuring and treatment of flax, as well as on the varieties of seed, should be studied and carried out by the Department of Agriculture according to the advice of the Consultive Flax Committee.

20) The Irish Department of Agriculture ought, lastly, to get together an expert staff for the practical cultivation, treatment and sale of flax, and should put this staff at the disposal of groups of producers.

1162 **The Cultivation of Flax in France. Flax Competition for 1911.** (La culture du Lin en France. Concours linier). *L'Engrais*, N. 11, p. 297, Lille, 17, March 1911.

France

The French Flax Committee is organising a Flax Competition for the year 1911 in all the Departments of France.

The cultivators to whom they appeal are those who have planted an experiment field in flax of at least 75 *ares* (about 2 acres) and have made some comparative studies of seed or of manure.

Special rewards will be given to those assistant instructors who may have succeeded in planting flax on a large scale in their own or neighbouring districts.

The programme of the competition will be sent on request by Mr. Albert Durand, Secretary of the Flax Committee, 6 Rue Faidherbe, Lille.

1163 **Hemp-Culture in Madagascar.** (La culture du Chanvre à Madagascar). — *La Quinzaine Coloniale*, N. 7, p. 247, Paris, 10 April 1911.

Madagascar

Hemp grows very readily in various regions of Madagascar, especially in the province of Vakinankaratra, where some satisfactory experiments have been carried out. At present no business is done in hemp, on account of the defective method of preparation. Some native retters are to be sent to the districts where the plant is cultivated, in order to teach the method of treating hemp.

1164

A. BELLUCCI, AND T. VALBUSA. **Sugar-beet Culture Experiments in Italy**. (Esperienze sulla coltivazione della barbabietola zuccherina nella Provincia di Ravenna) *Cattedra ambulante d'Agric. per la Prov. di Ravenna.* pp. 54 + figs. Ravenna 1911.

Italy

These experiments were made near Ravenna during 1910, in a fertile alluvial soil.

The following are the chief results;

1) The varieties of Sugar beet which gave good results were the *Schlieckmann, orig. No.* 2, the *Rittergut No.* 15,(husked), the M. Deutsch B.A. 3 (No. 4), the *Rabbethge & Giesecke*, the *X. W. No.* 21; then come the *Vilmorin Andr.* & *C.A. No. 8 and* 9, the Buszczynski and the Lazynski N. 27; and lastly the Indigenous No. 45.

2) The varieties in which the proportion of sugar remained most constant and highest after the September rains were the *Schlieckmann*, the *Vilmorin*, the *M. Deutsch* and the *Rittergut.*

3) The quantity of beets produced, within certain limits, is in direct ratio to the early sowing, decreasing gradually and constantly with late sowing.

4) The proportion of sugar, and still more the purity of the juice, in respect to early or late sowing, follows the same lines as the production, with some rare exceptions.

5) Reasonably early sowing is preferable to late sowing.

6) March is the best month for sowing beet in the district of Ravenna.

7) Late sowing may sometimes give good results when the season is favourable.

8) In the fresh and deep soil where the experiments were made, the production did not vary directly with the space between the seeds.

9) The sugar content, with the exception of the first plot, underwent a slight but gradual decrease from the plots sown at fair distances apart (35 × 25, 40 × 20) to those sown at greater distances.

10) The purity of the juice followed the same lines as the sugar content, in regard to sowing,

11) The increase in production due to potash fertilisers did not pay, the soil being naturally rich in potash. Kainite gave better results than any other potash fertiliser.

12) The addition of potash salts in all cases increased the sugar content of the beets:

13) Potassium sulphate increased the purity of the juice.

14) Chloride of potassium and kainit decreased the purity of the juice.

The minimum rainfall in these Ravenna experiments occurred in May and August, the maximum in September.

The absolute maximum of sugar content was 22.50%, with a juice purity maximum of 91.35%. The average maximum of sugar content was 18.93%, and of purity 87.74 %.

1165 F. G. Krauss. **Peanuts in Hawaii.** (Hawaii Agricultural Experiment Station, Honolulu) Press Bulletin N. 28, pp. 11 + 2 pls.

Hawaii

There are two more or less distinct types of peanuts. Under Hawaiian conditions, the « bunch » type grows into an erect, compact bush 8 to 24 inches (20 to 60 cm) high with an equal spread of foliage; the « running » or « flat » type is decumbent and spreading, rarely more than 1 foot (30 cm) high, and in some varieties attains a spread of fully 5 feet (1.52 metres) in diameter. The first type is best adapted where the crop of nuts is the principal object; the second is preferable for fodder or green manuring.

Except for an occasional small planting made by Chinese and Japanese gardeners, very little has been done to develop peanut as a field crop in Hawaii. Experiments conducted by the Hawaii Agricultural Experiment Station, show that the peanut would deserve extensive planting in the islands.

The yields of peanuts obtained by the Station and cooperative experimental plantings for the years 1908, 1909 and 1910, are summarized in the following table:

VARIETY OF PEANUT (Arachis hypogaca)	Calculated to average acre yields			Highest Acre Yield (lbs)	Lowest Acre Yield (lbs)	Days to Maturity
	Green Weight Whole peanut (lbs)	Cured Weight Nuts (lbs)	Cured Weight Tops (lbs)			
Spanish.	10 454	1 728	1 835	3 858	564	168
Bunch Jumbo . . .	8 961	1 881	1 950	3 225	837	158
Running Jumbo . .	14 439	2 077	2 256	4 729	675	158
Virginia Creeping . .	—	2 026	2 205	2 489	920	157
Bunch Virginia (Sport).	16 803	2 249	2 714	4 130	832	173

The best results appear invariably to have been obtained on light soils with moderate moisture.

Under several years culture in Hawaii, the peanut has much improved, bearing larger and heavier kernels.

The following are the average yields, in number per plant, of sound, well-matured nuts taken from a large number of select plants used for breeding purposes: Spanish 145; Bunch Jumbo 184; Running Jumbo 208; Virginia Creeping 219; and Virginia Bunch 190. Numerous selections of Virginia Creeping having yielded 250 and more sound nuts. The green weight of such plants has averaged something over 10 lbs (4 530 kg) each, and the cured pods have run about 250 seeds per pound as against 325 pods per pound (620 seeds as against 710 pods per kg) of the imported stock. A single plant of the sport Bunch Virginia, has yielded 280 nuts, weighing 1 pound 3 ounces (538 gr.).

1166

CL. GRIMME. **An Oily Fruit of Guatemala.** (Un fruit oléagineux du Guatemala) (Chem. Rev. d. Fett. u. Harz. Ind. 1910, p. 158) *Journal de Pharmacie et de Chimie*, 103 année, 7 Serie, Tome III^e, N. 7^e, p. 358, Paris, April 1, 1911.

Guatemala

This fruit, which is not yet determined from the botanical point of view, resembles the cherry, and belongs to the Simarubaceae, perhaps to the *Picramnia Carpinterae* Polack. The stone has the appearance of a coffee bean, but is very soft.

Extraction by ether gave 75.98% of a solid, crystallized fat, with the following characters:

Melting point	50° to 52°
Index of acidity	3.6
Iodine number	63.9
Refraction index	1.4624 at 50° C.
Saponification index	156.2
Non-saponified matters	1.74%

This fat contained 96.3% of fatty acids, having the following characters.

Melting point	56° to 57°
Saturation index	192
Molecular weight	292.5
Refraction index	1.4538 at 70° C.
Iodine number	87

The residue after ether extractions contained 35.23 % of protein.

1167

The Tea Industry in Russia. (L'industrie du Thè en Russie) — *Feuille d'Informations du Ministère de l'Agriculture, XV* annèe, n. 11 p. 4, Paris, March 14, 1911.

Russia Caucasus

The cultivation of tea in the Caucasus (1) is the object of investigation and encouragement by the Russian Ministry of Agriculture.

To Colonel A. Solovtzeff, who was awarded a first Prize in 1896 at the International Exhibition at Nijni-Novgorod, belongs the merit of having placed this industry on a firm footing.

From some information reprinted in the *Feuille d'Informations* from the Bulletin of the French Chamber of Commerce at Constantinople, it appears that a complete crop is not obtainable until the plants are from 7 to 8 years old.

The first picking is, as a rule, done at the end of the fourth year; and three or four cuttings are made each year. The crop per hectare is about 3 200 lbs of green leaves which would make about 740 lbs of dry leaves.

The sale price on the spot is 50 centimes (5 d.) per lb (409 gr.). and the price of a pound of tea at St. Petersburg, including all expenses, is 2.35 Frs. (1 s. 10 d.).

According to the analyses of Trans-Caucasian soils made by Professor Kzassunnoff and others, there are from 28 000 to 33 000 hectares of land which are suitable for tea cultivation in the districts of Batum, to the west of Kontais, and to the south of Sukhum. This area might yield annually from 21 to 26 million lbs of tea, which could easily be sold in Russia, as she imports annually 144 million lbs of tea.

1168

Experimental Work at Tobacco growing Stations in Canada. *Bulletin* No. A-9, *Tobacco Division, Department of Agriculture,* Ottawa, Canada, p. 51.

Canada

This Bulletin has three divisions. The first contains a statement of the object of the three Experimental Stations organized in Canada, chiefly for the growing of tobacco, together with a brief analysis of the results already obtained. Parts 2 and 3, prepared by officers in charge of the Stations, present a report of work done and progress made. Complete instructions are given for preparing the soil, planting, cultivating and harvesting the crop, together with notes on varieties of tobacco, methods of manuring etc· Twelve half-tone illustrations serve to give a clear understanding of the text in regard to a subject comparatively new to Canadian farmers.

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(1) See this Bulletin N. 2, Dec. 1910, p. 263.

F. CHARLAN. **Tobacco Growing in British Columbia.** *Bulletin* No. A-10, *Tobacco Division, Department of Agriculture,* Ottawa, Canada, p. 15. **1169**

Canada: British Columbia

This Bulletin contains a summary of observations made by Mr Charlan, Canadian Chief of the Tobacco Division, during a trip in the Province of British Columbia. The possibilities of tobacco-growing from a purely agricultural standpoint are discussed. Advice is given for the guidance of beginners on the proper method of tobacco cultivation.

F. CHARLAN. **Financial Situation of the Tobacco Growers in Canada.** *Dep. of Agric. Tobacco Division, Bulletin* N. A-11 p. 12, Ottawa, Canada January, 1911. **1170**

Canada: Quebec. Ontario

In Canada, perhaps more than anywhere else, tobacco growing has justified its reputation for being a profitable industry.

In the Quebec centres the yields have long been limited to 1000 to 1200 pounds per acre. In years when high prices prevail, a gross revenue of $ 100 per acre is for from being exceptional. The cost of production, including the personal work of the farmer and his family, seldom exceeds $ 45 to $ 50 per acre. The net profit is then about fifty dollars per acre. An experienced grower can easily obtain heavier yields and realize as much as $ 75 per acre and even more.

The brillant prospects opened to the tobacco grower by Canadian legislation will probably encourage him to modify his rather antiquated methods of culture. It will then be possible for him to increase his net average yield to $ 75 and even to $ 100 per acre in certain cases. Under such conditions tobacco culture becomes one of the most profitable industries.

In Ontario, owing to the variety most generally grown (Burley) the yields are much heavier than in the province of Quebec. When in both these provinces more attention is given to the soil, it will be possible to maintain the average between 1500 and 2000 pounds per acre. At this rate, if the market price is 9 cents per pound (it is actually from 10 to 11 cents), the net profit per acre will be from $ 80 to $ 100.

It is admitted by American growers engaged in the experiments undertaken in Canada, or who have visited its tobacco-growing centres, that this branch of Agriculture is nowhere as prosperous as it is in Canada. The immigrant with capital might well be advised that it is one of the most profitable in which be could invest his money.

1171 ARDOUIN-DUMAZET. **Hop Gardens in French Flanders** (Les houblonnières de la Flandre française). — *Journ. d'Agric. pratique*, N. 14, pp. 439-441, Paris, 6 Avril 1911.

France: Flanders

There are some hop gardens in the Cambrésis which cover an area of 500 hectares; in this region the plants are trained on wooden poles, whereas in Flanders, on the borders of Belgium, iron wire frames are used. The Flemish hop region includes only about 600 or 700 hectares in the cantons of Steenwoorde and Bailleul; its main production centre is Boeschèpe. The fields are surrounded with tall poles bent outwards joined together at the top by thick iron wires; thinner wires are drawn from these towards the ground near the stocks of the hop plants, which are 2 metres apart.

The Boeschèpe mark is considered the best. The association of the hop-planters dates from March 15th, 1859. A Commission nominated by the planters superintends the packing of the hops into bags and examines the quality of the product. These measures enable the farmers of Boeschèpe to keep up their mark and to obtain a high price on the market: 50 fr. per quintal of 50 kg.

As soon as they are gathered, the hops are taken to a drying room or oast. The oasts are still primitive, and Flanders has been outstripped by England and Belgium in this respect.

1172 P. JEANCARD AND C. SATIE. **The Essences of Rosemary and their principle Characteristics.** — (Les essences de Romarin et leurs principales caractéristiques) *Revue Générale de Chimie pure et appliquée*, 13 année, T. XIV, n. 8, pp. 123-131, Paris, April 23, 1911.

France. Austria. Spain. Algeria. Tunis

The distillation of rosemary is carried on in France, Austria, Spain and the north of Africa, in the following districts;

1) France: Alpes-Maritimes, Basses Alpes, Var, Gard, Aude.

2) Austria: the Dalmatian Islands: Lesina, Lissa, and Solta.

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(1) See this *Bulletin*: Nov. 1910, p. 76 - Dec. 1910, p. 267, 269 - March 1911, n. 843. (*Ed.*).

3) Spain the provinces of Granada and Malaga.
4) Africa: Tunis and Algeria.

The essence known in trade as « Italian Rosemary » comes from Dalmatia.

According to the analytical data given in the paper, the variations in the characters of the pure essences are as follows.

Specific weight at 15° C. 0 900 to 0.920
Rotatory power 0 to ⊥ 12°
Solubility at 15°, alcohol at 90° . 0.1 to 0.5.
Solubility at 15° C. alcohol at 85° 0.5 to 0.1.
Index of saponification after acetylation 35 to 60.
Total Borneol 9.88 to 17.28

Rosemary essences are sometimes mixed with essence of sage. It is uncertain whether this mixture constitutes a fraud as both products have practically the same value on the market.

The sage and rosemary differ considerably in their organoleptic qualities, as well as in their constants. The following are the constants of sage essence

Specific weight at 15° C. 0.925 to 0.930.
Rotatory power + 10° to ⊥ 20°.
Solubility alcohol at 80°, 1 to 2.
Solubility: alcohol at 75°, 1.5 to 5.
Solubility: alcohol at 70°, 8 to 12, (and 20)
Index of saponification, 30 to 40.
Index of saponification after acetylation, 70 to 90.

P. Dussert. **The Pruning of Vanilla at Mayotte.** (Le taille de la Vanille en usage à Mayotte) *L'Agriculture pratique des pays chauds*, N. 94.pp. 34-39, Paris Jan. 1911. **1173**

Mayotte

In the vanilla orchards of Dapany (Mayotte), a special method of pruning has been applied to the vanilla plants, whose delicacy has always been a great difficulty. The object was to develop stem and branches. The treatment insures the following characteristics·

1. No fruit on the main stalk, which thus keeps all its strength for acting as a sap duct;
2. Fructification localised on the secondary branches, which are easily regulated as to number and length;
3. Suppression of the branches immediately after they have fructified.

The vanilla plant, when treated thus, if grown on flat ground, does not appear as usual in the form of a very long and bifurcated liane, but grows bushy, with numerous short stems.

The success of this method, lies in the fact that by the simple operation of bending, the branches which bear the fruit bcome secondary branches, and their removal, when the crop is gathered, does not interfere with the main stem. The fruit appears each year on secondary branches, which have not borne the previous season.

1174 HARMS. **Cultivation of the *Kerstingiella geocarpa* Harms. in Tropical Africa** (Ueber die Verbreitung der *Kerstingiella geocarpa* im Tropischen Afrika). — *Deutsche Kolonialzeitung*, N. 10, p. 160, Berlin, März 11, 1911.

Togo

The natives of Togo cultivate a bean, *Kerstingiella geocarpa*, which includes three varieties differing in the colour of the seed. The plant is analogous, if not identical, to that which grows in Dahomey, where it is called *Doi* (*Voandzeia Poissoni*, A. Clerc) (1). After flowering, the fruit of this Leguminosa works down into the soil, where it ripens.

The excellent qualities of this legume should lead to its cultivation in the German, French and English Colonies.

1175 **Electricity in Horticulture.** *Fruit, Flower, and Vegetable Trades' Journal*. London, April 15, 1911, p. 337.

Great Britain: England

At a meeting of the Farmers' Club held in London early in April, Prof. J. H. Priestley read a paper on « Electricity as a Fac or in Crop Production ».

The investigations carried out resemble those made by Mr. J. E. Newman and Sir Oliver Lodge. At Evesham on Mr. R. Bomfords' farm a network of electric wires was erected over several fields of wheat, while other fields where the same kinds of wheat were growing, were used to control the experiment. The electrified wheat gave a yield varying from 13 % for Webb's Red Standard to 39 % for Red Fife in excess of the yield of the un-electrified wheat.

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(1) See this Bulletin, Nov. 1910, p. 79. According to Auguste Chevalier *C. R. de l'Acad. de Sciences*. Tome 151, N. 26, p. 1374. Paris, 27 Dec. 1910. *Kerstingiella geocarpa* Harms is identical with *Voandzeia Poissoni* and as Dr. Harms had studied this plant 18 months earlier, the name he has given should be adopted and *Voandzeia Poissoni* considered as a synonym. Neither of the two names is entered in the *Index Kewensis* nor in its supplements up to 1905. (*Ed.*).

In these experiments the tension was transformed by a dynamo to 100 000 volts, the wires carrying only 0.10 amperes. Mr. Priestley also dealt with the application of electric light in greenhouses for stimulating plant growth (1).

1176

The Trade in Vegetables and Early Fruits in the United States (Le Commerce des légumes et des Primeurs aux Etats-Unis). — *Bull. de l'Office du Gouv. Général de l'Algerie*, N. 8, p. 119, Paris, 15 Avril, 1911.

United States

It is a notable fact that vegetables import trade into the United States is continually increasing. Green peas and beans are imported from the following countries: Austria, France, Germany, Italy, the United Kingdom, Canada and Mexico.

Asparagus is more generally sold in tins; very little arrives in the fresh state. The Argenteuil asparagus is particularly appreciated. In years when the home crop is poor, potatoes are imported in very large quantities, and the New York market may become of considerable interest to European exporters. The chief exporting countries are: England, Canada and the Bermudas. In addition to the different vegetables mentioned above, a large quantity of other vegetables is imported from Europe in tins: namely, carrots, celery, spinach, lettuce, turnips, sorrel, artichokes, cauliflowers, tomatoes, etc.

The early fruits can only be imported in small quantities.

1177

Market Garden Cultivation at Dakar, Senegal (La culture maraîchère à Dakar, Sénégal). — *La Quinzaine Coloniale*, N. 7, p. 245, Paris, 10 Avril, 1911.

French West Africa: Senegal

Mr. W. Ponty has been encouraging the development of market gardening at Dakar, not only for local consumption, but also with the object of provisioning ships. The results obtained are excellent, and Dakar produces vegetables that are not inferior to those of France.

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(1) Compare with: T. A. Priestley, *Electro-Culture, Overhead Electrica Discharges and Plant Growth*, abstracted in the publication of the Intelligence Office of the Intern. Inst. of Agriculture, *The Science and Practice of Farming during 1910 in Great Britain as seen through the Scientific and Agricultural Press*, Rome, 1910, p. 225. (*Ed.*).

1178 **The Cultivation of Onions, near Naples.** (La coltivazione delle cipolle nella regione Vesuviana). — *La Rivista Agraria*, No. 2 e 3. p. 34, Napoli, genn. 15 e 22, 1911.

Italy: Naples

Summer onions are grown near Naples, in market gardens, the spring varieties being a field-crop often grown in rotation with maize or hemp. The onions grown in clay soil contain a high percentage of essential oils. They are either sown on the spot or transplanted from a nursery.

Generally speaking, the *white* onions are summer, the *coloured* ones spring, varieties. The best Neapolitan varieties are: the *Barletta Onion*, the *Nocera*, the *Naples* and the *Bajano*. The most appreciated is the *Rocca Onion*.

Onions require a soil rich in potash. Near Vesuvius, the natural richness of the volcanic soils in potash, makes a potash fertiliser unnecessary.

The production is as follows in the province of Naples:

Kitchen garden onions: from 80 to 100 quintals per hectare.

Field onions: from 100 to 250 quintals per hectare.

The production is poorer in the kitchen gardens, because the onions are gathered before they are fully grown, in order that they may be put on the market more rapidly.

1179 GRANATO. **The Cultivation of Onions at St. Paul, Brazil.** (A cultura da cebola em S. Paulo). — *Boletim de Agricultura*, N. 11, p. 981, Sao Paulo, 1910.

Brazil: St. Paul

The cultivation of onions was introduced into the State of S. Paul some time ago: the early white, the Italian white, the Egyptian and Madeira onions, and the Covent Garden variety have been tried with excellent results.

As Brazil imports about 500 000 kg. of onions from Portugal and Italy every year, it is clearly in her interest to encourage this cultivation on her own territory.

1180 H. SACHS. **Cultivation Experiments with Various Varieties of Peas.** (Die Erbsen-Anbauversuche im Jahre 1910). *Mitteilungen der Deutschen Landwirtschafts-Gesellschaft*, XXVI J., Stück 14, pp. 175-176, Berlin, April 1, 1911.

German

This is a description of the results of some experiments which were made in 1910 in continuation of those begun for the first time in 1909. These were carried out in five different localities, on plots of 2 ares and in two on plots of 1 are and 1.5 are respectively. The five following varieties were used, being given in order of ripening *Express. Ueberreich, Monopol, Schnabel, Canning.*

	Production per hectare	
	Total Crop kg	Maximum crop per plot kg
Schnabel (improved)	6 632. 5	11 335
Express	5 319 —	12 050
Monopol	4 452. 5	10 050
Ueberreich	4 160 5	8 135
Canning	4 078 —	7 200

The yield in seeds was as follows

Schnabel	maximum	72. 5 kg,	average	61 — kg
Express	»	63 6 »	»	45 — »
Monopol	»	63 — »	»	36. 5 »
Canning	»	48 — »	»	41. 5 »
Ueberreich	»	39 6 »	»	29 1 »

The results of the two years' experiments lead to the conclusion that the trial varieties are perfectly adapted both for cultivation in fields, and for preserving, but low-growing kinds are the best, the use of props being costly.

E. V. Wilcox. **The Management of Pineapple Soils.** *Hawaii Agric. Exp. Station, Honolulu-Press,* Bulletin N. 29, 10 pages. **1181**

Hawaii

The cultivation of pineapples in Hawaii has greatly developed during the past fifteen years, a large part of the pineapple crop being grown on the upland plains of Oahu, principally in the Wahiawa and adjacent districts.

The pineapple soils of Oahu may be divided into two classes as regards colour, viz., black and red soils. In a preliminary report (*Hawaii Sta. Press* Bull No. 23) the peculiarities of the black manganiferous soils were emphasized; in the present bulletin the management of the red soils is considered.

The practical results of the writer's investigations are summarized as follows:

The continued cultivation of pineapples on the same land (which contains large percentages of finely divided ferric hydrate and small amounts of humus) has already brought about conditions unfavourable to the growth of the crop. The use of fertilizers, such as lime, and manure have not restored this soil to its original productivity

The physical condition of the soil becomes affected and great exhaustion results.

While only a slight change has taken place in the humus, the clay has become deflocculated, thus reducing the size of the pores in the soil and effectually hindering drainage. This condition is brought about by working the soil when it is wet. In some instances, however, it has been caused by beating rains, accompanied by floods. In such puddled soils proper aeration is impossible and bad physical, biological and chemical conditions prevail.

The best remedy is prevention; these soils, as all clay soils, should not be cultivated when wet, for damage is sure to result. Sunshine and air aided by thorough tillage when the soil is in proper moisture conditions will help to restore fertility. The best possible drainage should be provided by introducing ditches at short distances apart. Manure, especially if accompaned with ample aeration, will tend to make the soil more porous and, thus, aid drainage. Lastly the continued cultivation of pineapples should give way to crop rotation.

1182 **The Fruit and Vegetable Trade on the North East Coast of England in 1910.** (Le commerce des Fruits et des Légumes sur la côte Nord-Est anglaise en 1910). — *Feuille d'Informations du Ministère de l'Agriculture*, N. 16, Paris, 18 Avril, 1911.

Great Britain: England

The North-east coast of England offers an extremely important market for the fruits and vegetables which England is obliged to get from abroad to the extent of three quarters of her consumption. Hull is the most important market on this coast, Newcastle coming a long way behind. The geographical situation of the former lends itself admirably to the fruit trade, and the port possesses some special conveniences. Since 1907 the trade in fruit and vegetables at Hull has risen to about 25 million francs (£ 1.000.000).

Oranges arrive in large quantities from all the exporting countries. The importation of bananas from the Antilles and the Canary Islands has been continually increasing since the ship services have been improved. The Canaries send bananas, tomatoes and potatoes every fortnight.

The importation of oranges and lemons from Italy is decreasing. Spain furnishes the largest quantity of fruit directly, and Belgium the largest quantity of vegetables.

The total importation in 1910 was as follows:

Apples and Pears	4 198 tons
Cherries	—
Bilberries	80 564 packages (1)
Currants	16 362 »
Grapes	29 026 »
Melons	18 151 »
Oranges and Lemons	161 036 boxes
Plums	38 636 packages
Bananas	1 090 tons
Carrots and Turnips	1 544 »
Onions	8 628 »
Potatoes	10 850 »
Tomatoes	18 969 packages
Cabbages	5 517 »
Various vegetables	10 670 »

1183

HORNE. (Brit. Consul) **Raisin Production in the Liao-Tung Peninsula.** — *The Board of Trade Journal.* N. 736, p. 40. London, Jan. 5, 1911.

Japanese Empire: Liao-Tung

A successful experiment in the production of raisins has been made by the Agricultural Experimental Station at Dairen, (Dalny). It is estimated that, fresh grapes costing 4-4 ½ sen (2) per lb., dry raisins would cost 13 ½-15 sen per lb. and that the wholesale price of the raisins would be 20-25 sen per lb.

1184

J. L. VIDAL. **The Period for Pruning the Vine with Regard to the Reserve Function of the Root.** (L'époque de la taille de la Vigne, en considération de la racine, organe de réserve). *Revue de Viticulture,* N. 897, pp. 219-222, Paris, Feb. 23, 1911.

France

The question of the most favourable period for pruning the vine is a very complicated one, and the various opinions expressed lead to the most contradictory conclusions; Mr. Vidal briefly reviews what has been said on this point, from the oldest writers to those of the present day, and deduces the following facts:

1) The pruning may be done, provided it be suspended during the periods of greatest cold, from the ordinary falling of the leaves

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(1) From 20 to 25 packages are necessary to make a ton, according to the nature of the merchandise. (*Ed.*).

(2) 100 sen = 1 yen = 2.55 frcs. (*Ed.*).

until the vine begins to bleed, and may even be done as late as the bourgeoning, without much risk.

2) Too early or too late pruning weakens the plant, and delays the appearance of the bourgeons; and the earlier, or later, the pruning, the worse the mischief.

3) From the fall of the leaves to the beginning of the bleeding, the pruning has the effect of delaying the bourgeoning and the later the pruning the later the opening of the buds.

4) The southern writers prefer the pruning to follow the very cold period, while those on the shores of the ocean prefer the pruning to precede the cold.

5) There is no absolute certainty in regard to the efficacy of late pruning against frost.

6) Late prunings with a previous « espoudassage » (1), are less weakening.

7) The loss of sap consequent on late prunings is only slightly prejudicial.

8) Autumn pruning is advised for enfeebled vines, which then give finer fruit.

9) Late pruning lessens the dropping, and in certain cases increases, in others, decreases the production. A sufficiently early pruning has the same effect on the fructification and on the vigour as late pruning.

1185 **The Experimental Pruning and Manuring of Olive Trees at Spoleto in Italy.** (L'oliveto dimostrativo dell'Oleificio Sperimentale di Spoleto). — *Il R. Oleificio Sperimentale dalla Calabria all'Umbria. Attività, Esperienze, Ricerche, Studi,* Tip. dell'Umbria Spoleto, 1911.

Italy: Umbria

The cultivation system adopted in the Olive plantation of the Spoleto Experimental Station is as follows. The grove is divided into two parts, on which the biennal pruning is carried out, alternating with a winter cutting of branches, which is in reality only a reduced pruning. Fertilisers are distributed as follows: in the portion that is pruned in the ordinary way: 1 kg. of superphosphate and 0.500 kg. of chloride of potassium are given per plant. In the year when the pruning is carried out, some superphosphates and from 25 to 40 kg. of farm manure or sheep manure is spread over half the portion, a green vegetable manure being worked into the other half. In this way, an exclusively mineral manure is supplied during the period when the ordinary pruning causes the cutting off of the larger amount of branches from the plant, so that the relation between the branch and root systems is not altered; on the other hand, stimulating organic and nitrogenous fertilisers are given after the light winter pruning.

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(1) In the Department of Hérault, the first part of a pruning, which is done in two parts, is called "espoudassage". The operation is called "fiançailles" in Charentes and in Yonne, "curage en pied". (*Ed.*).

Investigations have been begun on the effects of the addition of manure in autumn and in spring and on the treatment against *Cycloconium* by a summer spraying, or by two sprayings in spring and summer, with Bordeaux mixture and with a mixture containing copper sulphate, iron sulphate and lime.

The effects on olive trees of cyanamide on a calcareous soil have been studied. The experiment was made on 36 trees, to which doses of cyanamide of 0.750 kg., 1 kg., 1.50 kg. and 2 kg. were given with other manure. The fertiliser was put down in April, and in August some leaves were observed to be scorched at the tip, this scorched appearance was greater where the larger amount of cyanamide had been given. In November many of the leaves fell, but the addition of stable manure appeared to lessen these effects. In the following April, the olive trees which had received large doses of cyanamide bore very few leaves and the young shoots were weak and stunted. The olive trees which served as control vegetated regularly.

These experiments show that calcium cyanamide in larger doses than 1 kg. per olive tree, in rocky calcareous soils, may be harmful.

MOREAU. **Olive Cultivation in the Matmata in Tunis.** (La culture de l'olivier aux Matmata). — *Bulletin Régence de Tunis*, N. 55, Tunis, 1910. **1186**

Tunis: Matmata

The number of olive trees in the region of the Matmata, at present 60 000 at least, is increasing yearly in the most satisfactory manner. The plantations are entirely carried out by the natives; there is not a single European estate in the territory.

The pruning of young olive trees is begun at five years, and some very fine results might be expected from the regeneration of old olive trees, which has given such excellent results in the North of Tunis.

The method of extracting the oil in this region has not varied for centuries.

1187 **Apple Cultivation in Nova Scotia.** (Culture de la Pomme en Nouvelle Ecosse). — *Rapport du Commissaire de l'industrie laitière et de la réfrigération.* Année terminée le 31 mars 1910, pp. XI 159. (137-139) Ottawa, 1910.

Canada: Nova Scotia

The apple occupies almost exclusively the attention of fruit growers in Nova Scotia. The apple industry is almost entirely limited to three counties: Annapolis, Kings and Hants. From Digby to Falmouth, in the valley of the Annapolis and Cornwallis rivers as well as in the valley of the Gaspereaux and Avon, the apple crop is practically the only paying crop. The specialisation in this industry has perhaps reached a dangerous point. As many of the large tree growers keep little or no cattle, the provision of farm manure is not sufficient for their orchards.

The varieties most cultivated in Nova Scotia are: Baldwin, Northern Spy, and Gavenstein. The latter is losing its popularity, however, because the tree appears to be subject to crown rot.

During the season 1909-1910 there were at least 70 warehouses for the apple industry in the Annapolis and Cornwallis valleys.

1188 A. G. Turney. **Apple Growing in New Brunswick.** — *The O. A. C. Review.* Vol. XXIII, N. 6, March, 1911, pp. 287-290. Guelph, Ont. Canada.

Canada: New Brunswick

After reviewing the condition of the apple growing industry in various provinces of Canada, the writer refers to the adaptability of extensive sections of New Brunswick for orcharding, in which all the standard Canadian grown apple varieties can be produced profitably. The claim is made that highly coloured varieties, such as Duchess, Dudley, Alexander, Wealthy, Fameuse and Mc. Intosh Red can be grown to perfection. The best apple lands of the province are said to be in the lower St. John Valley, between St. John and Fredericktown.

1189 **Almond Cultivation and Trade in Sardinia.** (Culture et commerce des Amandes en Sardaigne). — *Feuille d'Informations du Ministère d'Agriculture*, N. 15, Paris, 11 Avril, 1911.

Italy: Sardinia

The rise in prices and the very remunerative speculations which have been made during recent years in the commerce of almonds have caused a very noticeable tendency towards the extension of almond cultivation in Sardinia. Numbers of farmers have substituted almond groves for their vineyards affected by phylloxera. The day is probably not far distant when the Sardinian almond will compete in quantity and quality with the product of countries most renowned for almond production. The Sardinian almonds are of two species: the almond of the plains is flat, broad and thick, while that of the hills is small and rounded. Both sweet and bitter almonds are grown in Sardinia: the latter going mainly to Germany.

The present Sardinian almond production of an average season is about 10 000 quintals.

The Exportation of Almonds and Dates from Persia in 1909-1910. (L'exportation des Amandes et des Dattes de Perse en 1909-1910). — *Bulletin de l'Office du Gouv. Général de l'Algérie*, No. 8. p. 119, Paris, 15 Avril, 1911. **1190**

Persia

The exportation of Persian almonds from the port of Bender-Bauchir in 1909-1910 was higher than at any time in the course of the past three years, the falling off in the production of Southern Europe and America having increased the demand for this commodity.

1907-1908	529 tons.
1908-1909	410 „
1909-1910	627 „

Of which 25 tons went to the United States.
„ 342 „ „ „ India.
„ 201 „ „ „ the United Kingdom.
„ 51 „ „ „ Germany.

The almond crop at Ispahan and Schiraz was exceptionally good.

In 1909-1910, 288 tons of dates were exported from Bender-Bauchir, 264 tons of which went to India, while in 1908-1909 the total exportation was 294 tons, 292 going to India.

TSCHIRCH and RAVASINI. **The Wild Fig and its Relation to the Capri-fig and the Cultivated Fig.** — *C. R. de l'Ac. des Sciences*, T. 152, No. 13. pp. 885-888. Paris, 27 Mars 1911. **1191**

Italy

The wild fig of Italy and the Capri-fig were long thought to be identical. A whole year's examination of more than 20 000 inflorescences from all the forms of fig-tree growing throughout Italy has given results that lead to an entirely different conclusion.

Far from being identical with the Capri-fig, the wild fig of Italy is a veritable prototype; it is an excellent and very constant type, diclinous, monoecious, which has continued to exist far from any other fig cultivation in some little islands of vegetation in Upper Italy, and may be reproduced from seeds of the cultivated fig-tree if the inflorenscences of the latter are visited by the *Blastophaga* (Diptera). This species of fig is called *Ficus Carica* (L.) Tschirch and Ravasini, and is characterised by three generations of fruit which succeed one another on the same tree.

The Capri-fig and the cultivated fig are cultural varieties, which cannot be multiplied by seed, but only by layering or grafting. The Capri-fig (*Ficus Carica, α Caprificus,* Tschirch and Ravasini) has three generations of uneatable fruits with male flowers or galls, while the cultivated fig (*Ficus Carica β domestica* Tschirch and Ravasini) produces three generations of eatable fruit (*Fichi-fiori, Pedagnuoli, Cimaruoli,* as they are called in Italian) which contain only female flowers.

In the wild fig the pollination is done by the *Blastophaga,* which, in its biological cycle, passes from the gall flower contained in the "*manune*" fruit to the male flowers of the "*profichi*" and the female flowers of the "*fichi*". In the female cultivated fig pollination does not take place except by caprification, or else accidentally (without caprification) by the Blastophagae.

Caprification, which consists in suspending the male fruit (*profichi*) of the caprifig, or wild fig in the cultivated fig trees, is necessary for all kinds of figs which are to be dried and exported; caprified figs are the only ones which can be preserved.

On the other hand, there are species of fig trees which have been differentiated for thousands of years, and produce without caprification or fecundation, sweet figs, which have no seeds and cannot be preserved. These are the "table figs", the ripening of which is purely carpological and is similar to that of seedless fruit.

1192 DUCOUSSO. **The Mulberry Tree in Syria.** (Le Mûrier en Syrie). — *Bulletin des Soies et des Soieries,* No. 1765, p. 4, Lyon, 4 Mars 1911.

Ottoman Empire: Syria

The kind of mulberry which is found most extensively in Syria and Lebanon is the "Dwarf mulberry of Japan", formerly called Cyprus or Cabroussi Mulberry.

This tree, which does not produce any fruit, gives two crops of leaves each year. Sandy soils are better for its cultivation than clay soils. The leaf of the wild stock, which is thinner and more tender than the leaf of the grafted mulberry, is given to the silkworm as soon as it is hatched, as well as at the beginning of each moulting period. It is for this reason that most mulberry plantations include a few plants of the wild stock. But the peasant of Lebanon, who has given up the cultivation of the vine and the olive tree for that of the mulberry, now prefers the orange tree on the plains and tobacco on the hills. Thus, in 1910, while many mulberry plantations have been cleared off the plain to make way for orange groves, not a single new plantation of the mulberry appears to have been made.

There are very few diseases in Syria which are likely to put the mulberry crop in danger, and in 1910 not a single tree was attacked.

Development of the Banana Industry in the Canary Islands. — *The Tropical Agriculturist.* p. 221-222, Colombo, March, 1911. **1193**

Spain: Canary Isles

Of the many species which have long been known in the Canaries, the banana that has survived for the special purpose of trade with Europe is the Chinese banana (*Musa Cavendishii*), the least tropical and therefore the most suitable for cold climates. Its cultivation is now at the height of prosperity, and good irrigated land near the coast commands the almost fabulous rent of £40 per English acre. The part of the Canary Islands where most of the bananas are cultivated is the well-known valley of Orotava, owing to the comparatively abundant and never failing supply of water, which no doubt filters down from the high and extensive plateau of the Canadas, nearly 7000 feet high, surrounding the peak of Teneriffe, which is over 12 000 ft.

During the winter months there are abundant rains and snow, and the water gradually percolates to the region of the coast, where it is tapped by long, horizontal tunnels. It is then carried along an aqueduct for a great distance to irrigate the land lying below. Irrigation in this country increases enormously the value of land and the great profits made from the cultivation of bananas are unequalled by any other crop.

K. YOSHIMURA. **Contribution to the Study of the Banana.** (Beiträge zur Kenntniss der Banane). — *Zeitsch. für Untersuchung der Nahrungs und Genussmittel,* Berlin, 1 April 1911. **1194**

Japan.

Mr Yoshimura's investigations regarded:

1) The chemical processes during the ripening of the banana;
2) Enzyme-action in the banana;

3) The sugars of ripe bananas.

Some green bananas were gathered on November 3rd, and succesively analysed at three different periods. The results were as follows:

		I Control analysis Nov. 9	II Analysis Nov. 16	III Analysis Nov. 23	IV Analysis Nov. 30
		%	%	%	%
Water		70.14	70.31	71.47	70.72
			In 100 parts of dry matter		
Tannin		1.75	1.71	1.71	1.67
Starch		68.16	47.51	24.40	14.48
Reducing sugar	Calculated as inverted sugar	0	5.54	13.47	19.83
Saccharose		0	14.92	28.60	30.12
Total sugar		0	20.46	42.07	49.95
Inverted sugar: Saccharose = 1.		—	2.69	2.12	1.52

The tannin content remains practically invariable during the ripening process, which would suggest that it has no part in maturation. The transformation of starch into sugar takes place very rapidly: 20 % of the total sugar is obtained at the end of the first week, 42 % at the end of the second week and 50 % at the end of the third. The ratio between saccharose and reducing sugar gradually decreases during the ripening period, which shows that the sugar produced at the beginning is transformed into reducing sugar under the action of an enzyme.

The heating of unripe bananas to 110-120° C. gave the following results:

		In the dry matter		
		Unripe control bananas	At the end of 2 weeks	
			Non-heated	Heated to 110-120° C.
		%	%	%
Starch		68 160	24 400	47 080
Reducing sugar	Calculated as inverted sugar	—	13 470	traces
Saccharose		—	28 605	—
Total Sugar		—	42 075	—

It is evident that the transformation of the starch into sugar is based on an action of the enzyme diastase, and the decrease of starch in the heated bananas is probably due to a corresponding formation of dextrine. The water extract of ripe bananas, submitted to autolysis at 50° C. for one hour, and the same extract boiled gave the following results:

	In 100 parts of fresh matter Boiled	 Autolysed at 50° C.
Reducing sugar } as inverted sugar	2.70 %	8.85 %
Total sugar . . } as inverted sugar	8.41 %	8.88 %

Which shows that the saccharose has been transformed into reducing sugar by an invertase active at 50° C.

Some pieces of the same banana, half ripe, analysed immediately after a slow drying at 50-60° C., gave the following results:

	Reducing sugar (as inverted sugar)	Saccharose	Reducing sugar: saccharose = 1
Direct analysis	4.50 %	9.75 %	2.155
Analysis after slow drying.	6.42 %	4.87 %	0.758

The slow drying favoured the action of the invertase and it is in this way that the oscillations which occur in the relation between the reducing sugar and the saccharose may be explained.

Some further investigations on the sugars found in ripe bananas led to the conclusion that bananas do not originally contain any other sugar than saccharose.

W. BURNS. **The " Pairi " Mango.** — *The Agricultural Journal of India.* Vol. VI, Part. I. Calcutta, January, 1911. **1195**

British India

In the Bombay markets the mango most in demand is the « Alphonse ». This variety has been distributed to most quarters of India, to the West Indies, to America, and to Australia. Next to this variety a less known variety called the « Pairi » has a large production and sale. The size of both varieties is fairly constant. The taste of the « Pairi » fruit is delicious, and slightly more piquant than that of the Alphonse; but it does not keep well. This fact and its different flavour make it a cheaper mango than the Alphonse. The Pairi mango tree has a most vigorous spreading habit of growth. This character makes it an excellent stock for a composite grafted mango giving a vigorous stem. Two sub-varieties of the Pairi mango are known: the *Moti Pairi* and the *Kagdi Pairi*, so called on account of its thin and shining skin. The fruit is said to have firmer flesh and to be superior in flavour to the ordinary Pairi. (1)

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(1) *Mangifera indica* has very many varieties, of which more than 500 are cultivated. See G. WATTS, *Dictionary of the Economic Products of India:* London, 1891, vol. V. p. 149. (*Ed.*).

Forestry.

1196 **Plans for Eastern Forest Reserves in the United States.** — *American Agriculturist.* New York, April 1, 1911.

United States

The United States Department of Agriculture announces preliminary plans for the proposed Appalachian and White Mountains forest reserves under the recently enacted Weeks law.

The States which have already passed Acts enabling the national Government to acquire land for the preservation of the navigability of streams are: Maine, New-Hampshire, Maryland, Virginia, West Virginia, North Carolina, Tennessee, South Carolina, and Georgia.

The first lands to be examined for purchase will be in the Appalachian and White Mountains. The lands acquired by the Government will be held as national forests. They will be protected from fire; and the growth of the timber will be improved as much as possible. The lands will not be game preserves, but will continue to be open to the public for hunting and fishing, in accordance with the laws of the State in which they are situated. The areas within which purchase of land is desired are set forth in detail in the circular of the Forest Service.

1197 JENTSCH. **Kamerun Forests and the Utilisation of Tropical Forests.** (Der Urwald Kameruns, Folgerungen aus den auf der Expedition 1908-09 gewonnenen Erfahrungen in Bezug auf den Zustand und die Nutzbarmachung des Waldes). — *Beihefte zum Tropenpflanzer,* B. XII, N. 1/2, pp. 199 + pl. V + 11, Berlin, März 1911.

Kamerun

The forest area in the German Kamerun, the composition of which is not well defined, may be estimated at 6 000 000 hectares.

The present publication explains the principles of the valuation and utilisation of these forests; which principles may eventually serve also for other forests in the tropics.

Twelve experimental plots were selected distinguishing primary virgin forest, secondary virgin forest and secondary forest. The plots, of about 0.5 hectare each, were in their turn subdivided in

6 classes, according to the size of the trunk at the height of a man's chest, from 7 to 60 cm. in diameter.

The average data obtained were the following:

Primary virgin forest; 63 species of trees; trunks per hectare 536; woody mass of more than 7 cm. in diameter 794 m³. Wood of the trunk exceeding 60 cm. at the height of a man's chest, 322 m³.

Secondary virgin forest: 95 species of trees; trunks per hectare 597; woody mass exceeding 7 cm. in diameter 426 m³. Wood of trunk exceeding 60 cm. at the height of a man's chest, 207 m³.

Secondary forest: the forest is formed of almost pure *Musanga Smithii.* Trunks per hectare 593; woody mass exceeding 7 cm. in diameter 270 m³.

Mr. Jentsch strongly recommends selection felling, for which an annual growth of from 3 ⅓ to 4.4 % might be taken as a basis which corresponds, in absolute figures, to from 19 to 33 m³ per hectare, or an average of 26 m³ per hectare.

As to the utilisation, after the selection felling, the following number of trunks remain: in the primary forest 93.5 % on an average; in the secondary forest 97.5 %, or an average altogether of 94 ²/₃ %. The products are divided as follows in the cutting:

Primary forest: timber 62 m³; residue 228 m³; total 390 m³ per hectare. Percentage of useful wood 42.

Secondary forest: timber 103 m³; residue 99 m³; total per hectare 202 m³. Percentage of useful wood 55.

Collective average: timber 146 m³; residue 193 m³; total per hectare 339 m³. Percentage of useful wood 43.

But as round wood is dealt with and account must be taken of defects, a further reduction of 33 % must be made, and the definite results would be:

Total quantity felled per hectare 339 m³; timber 97 m³; residue 242 m³; useful percentage 29.

In order to utilise afterwards a considerable proportion of the residues, which are ²/₃ or ³/₄ of the whole cutting, Mr. Jentsch suggests that dry distillation should be adopted, the products of which are in such demand.

The secondary products of the tropical forests under examination are, in addition to rubber, " rotang ", as the Spanish cane for manufacturing small pieces of furniture is called, the resins, barks and tannic extracts, and palm oil.

Three important supplements to Mr. Jentsch's report give the determinations of diameter, the nomenclature, and the botanical and technological descriptions of the timber of Kamerun.

1198 M. LEGA. **The Woods near the Lake of Mahabar.** — (In Dankalia ed in Abissinia). *Bollettino della Società Geografica Italiana,* N. 4, pp. 444-475, Roma, Aprile, 1911.

Abyssinia

The Lake of Mahabar lies in the region of Vorro-Callo, at an altitude of 2500 m. above sea level; it has no outlet. The natives say that there are no fish living in its waters. Beyond the lake there is a plain watered by small canals of a rudimentary construction. Over this plain, a ruinous deforestation is carried on, in order to extend plough cultivation. The forests are retreating towards the tops of the mountains; and if their complete destruction is still retarded the delay is due to their extreme density.

These forests are almost entirely composed of the Abyssinian Juniper (*Juniperus procera*). These are very tall trees which easily grow to a height of 30 metres. They give fine timber.

1199 E. A. SMYTHIES. **Some Aspects of Fire Protection in Chir Forests, *Pinus longifolia,* in India.** *The Indian Forester,* vol. XXXVII, No. 182, pp. 54-62, Allahabad, Jan. and Feb. 1911.

British India

Mr. Smythies considers three classes of Chir (*Pinus longifolia*) forest, according as they are protected against fire for 35 years or 15 years, or are burnt annually. A comparison between the three classes brings out several points of extreme interest:

1) After the year of burning, fire protection gives an extraordinary and universal stimulus to regeneration;

2) Successful regeneration is possible under the most favourable conditions without fire protection;

3) Long continued fire protection has always an adverse effect on regeneration;

4) Burning does not cause any damage to anything above the seedling and young plant-stage. Accidental fires, on the other hand, sometimes kill the tallest trees;

5) In the typical forests of *Pinus longifolia,* fire protection is useful as far as regeneration is concerned, but only when the conditions are favourable, and it is not always necessary;

6) When fire protection commences, regeneration takes place practically everywhere;

7) With the contrary method, regeneration is not required everywhere at once, but should be restricted to the regeneration areas and to blanks;

8) There is only one way to do this: namely to protect the regeneration areas, and to burn the remainder. Blanks whether protected or not, would fill up, provided the conditions are not unfavourable;

9) When an area has been successfully regenerated, it should be carefully burnt early in the year, when fires are not intense, and thereafter fire protection abandoned;

10) It is possible that long continued fire protection causes the power of the forest to deteriorate.

Fire protection would certainly be advantageous under the following conditions;

11) In all regeneration areas

12) In all areas where the protection of the soil is of paramount importance. Undoubtedly, the thick layer of grass and needles obtained in fire protected forests gives more efficient protection to the surface soil than the more scanty covering of burnt areas;

13) In all plantations;

14) In certain special cases where the crop has become so thin and scattered that it is advisable to have a complete regeneration even in the areas which are not in regular regeneration coupe.

15) In precipitous areas under the selection system.

Mr. Smythies dwells on the differences between European and Indian forests.

R. H. CAMPBELL. **Forest Fires and Railways in Canada.** — *Bulletin* No. 16 *Forestry Branch, Dept. of Interior*, Ottawa, Canada, pp. 8. **1200**

Canada Mr. Campbell observes that the proximity to a forest of a railway either in construction or operation increases the danger of fire. This, he says, is partly due to causes connected with the railway itself, and partly due to the crowds of land-seekers, prospectors, freighters, tramps and other irresponsible people, who follow it. The record of each year's conflagrations shows that the « iron road » is one of the chief occasions of forest fires. The question is treated by Mr. Campbell under the following heads: Fires arising from Railway Construction, Fires arising from clearing the way, Locomotive Equipment, Damages and Penalties. It is suggested that the Railways Act might well be amended, and the penalties be increased enough to make them serve as a deterrent and indemnify as far as possible the landowners.

1201 J. S. JONES. **Characteristic Northwest Timber-Soils in the United States.** — *The Journal of Industrial and Engineering Chemistry*, Vol. III, No. 4, pp. 246-247. Easton, Pa., April, 1911.

United States: North West

Among experts, an opinion seems to be prevalent that pine forest soils, as a class, are poor in the essential elements of plant nutrition. The analyses given indicate however very clearly that extensive areas of typical pine forest soils of the Northwest United States are well supplied with all the mineral elements required for plant growth, and are all exceptionally rich in phosphoric acid. As a rule, they are slightly acid in reaction; although substantial amounts of calcium are present, the application of finely crushed limestone is known to be of decided advantage in bringing them into a good state of cultivation.

1202 R. FALCI. **The Manna Ash *(Fraxinus)* Species and Varieties in Sicily.** — (Il frassino da manna in Sicilia). *Bollettino del R. Orto Botanico e Giardino Coloniale*, Palermo, Anno IX, N. 4, pp. 145-168.

Italy: Sicily

This is a small monograph on the manna *Fraxinus* from the scientific and cultural point of view. The varieties of ash cultivated in Sicily for the production of manna are numerous, and each of them has a special local name. They are multiplied by grafting, and belong to the *Ornus* type.

The varieties of the *Fraxinaster* type are preferred in the territory of Castelbuono, such are *Fraxinus excelsior, oxyphylla*, and *australis*, which supply the manna at an earlier date and allow the harvest to be finished before the autumn rains, which are earlier at Castelbuono than in the other districts where this tree is cultivated.

Of the varieties of *Fraxinus Ornus*, those belonging to the subspecies *rotundifolia* are considered the best manna producers, although it is the varieties belonging to the sub-species *angustifolia* which are generally cultivated at Cinisi and Capaci.

According to old statements which now have been verified by the writer, the production of manna ceases when fructification begins; for this reason the varieties which flower without fructifying are preferred and are multiplied by grafting. At Castelbuono four cultivated varieties of the *Ornus* type are considered non-fructiferous: *Ugliataru, Marcuzza, Quarrato* and *Misciuso*; and six varieties of the *Fraxinaster* type: *Bianco, Niurru, Russu, Tardiu, Ziriddu, Dinarieddu.*

The enumeration of 32 varieties cultivated at Cin si and Castelbuono is given, with their description and an appreciation from the point of view of yield in manna. The great number of the varieties, well specified by their morphological characters as well as by their yield, show the importance of this cultivation, which could be improved by selection and hybridisation.

F. B. KNAPP. **The Pruning of White Pine.** — *American Forestry*, V. XVII, N. 4, pp. 204-205. Washington, April 1911. **1203**

United States

There is a widespread theory among both American and German foresters that live branches must not be cut from evergreens. The experiments by Mr. Morton, begun in 1891, and later investigations by Mr. Knapp, Director of the Eric Forest School, show that the contrary, at least with reference to the white pine, may be maintained. Not only the pruning of evergreen trees can be successfully done, but it should form the basis for the treatment of woods in many places. Every system of forestry has its own method, and must make some sacrifice in order to attain its end.

The aim of this system is to secure a fair quantity of large, clean, high-grade timber. with a short rotation. To accomplish this, special attention must be paid to a small number of selected trees from the beginning. In the first stage of growth one must obtain by pruning and thinning a tall slender tree with clean bole of moderate length; and then get a rapid diameter growth by keeping the remaining branches alive and enlarging the head to its full capacity.

During the first two years the proper amount of protection, light, air, and soil are maintained and a single leader secured for each selected tree, and its neighbours are made subservient to it. When from 4 to 8 ft. high, the pruning of live branches is begun, leaving the head about one-third of the height of the tree. This pruning of live branches and the protection from competitors is continued through the first period of growth. Not over two whorls are taken off in any year. At the end of this time the result is a tree with a slender bole, no dead or sickly branches and a small but well developed head, closely surrounded though not crowded by more stocky trees. A typical tree with an 18 ft. bole would be 27 ft. high with 9 ft. spread of crown, a diameter of 4 in. breast high and between 2 and 3 in. just below the first branch.

Then begins the second and final stage of growth. The trees have been chosen far enough apart so that they will not interfere with each other, no more pruning is done, the last small wounds heal quickly. and from that time all the wood formed in the bole is clean. Through the ever increasing space occupied by the tree and the comparatively short stem, a good diameter growth is maintained to the end of the rotation and a large valuable log is obtained.

The Eric system may be used in combination with several of the older forms, but the most promising treatment seems to be the three-story one. It may be applied in plantations, in areas where pine is mixed with coppice and to especially good advantage on the many abandoned fields that are coming up by natural reproduction with a scattered growth of pine. The intermediate stages must vary with the condition of the tract when work is begun, but a fully stocked wood ready for the final cutting of the upper story under a sixty-year rotation will consist of three ages: forty trees, sixty years old ready to cut and occupying about eighty per cent of the space; forty moderate sized trees; and a greater number of small ones, the selected forty of which are just completing their first period of growth and require an insignificant amount of space. The nurse trees which have been retained, increase the crown cover and prevent the stand from becoming too open underneath. The spring after cutting the upper story, a dozen or more transplants are set out in each opening, and in twenty years another crop is ready to harvest.

1204 L. M. ELLIS. ***Pinus divaricata or Banksiana,* the Jack Pine, in Western Ontario.** — *Forestry Quarterly*, V. IX, No. 1, pp. 1-14 + 3 figs. Cambridge, Mass., March, 1911.

Canada: Western Ontario

Although Jack Pine owing to its frugality, hardiness and fecundity, grows on a wide range of soils, it nevertheless demands for its best development fairly deep sandy glacial till, such as is found on up-land gently rising ground where the drainage is good, and the moisture not far beneath the surface.

It grows still vigorously where hard wood, such as birch and aspen, no longer thrive, where successive fires burning off the loam and humus have created conditions unfavourable for their growth.

A mechanical analysis of typical pine soils shows that Jack Pine prefers naturally the coarser soils, although not necessarily confined to them:

SPECIES	Fine gravel 2.0 to 1 m.m.	Coarse sand 1 to 0.5 m.m.	Medium sand .5 to .25 m.m.	Fine sand .25 to .1 m.m.	Silt .05 to .006 m.m.	Clay .006 m.m.
White Pine (*P. Strobus*)	1.3 %	6.8 %	7.2 %	22.0 %	29.1 %	7.6 %
Red Pine (*P. Resinosa*)	.4 %	3.7 %	12.0 %	62.4 %	6.7 %	2.8 %
Jack Pine (*P. Banksiana*)	2.5 %	34.2 %	39.9 %	13.9 %	4.1 %	3.7 %

Jack pine at all ages is most intolerant of shade.

With the optimum amount of light, cones appear at the early age of ten years, but in close stands they do not appear until 5 to 10 years later. Where the soil is deep and loamy, and other conditions are favourable, seed production is delayed, but the increased quality of the seed balances the later fruiting. The period of maximum seed production lies between the ages of 40 and 90 years.

The germinating power of Jack Pine seed is high, 60 % to 75 %. The facility of reproduction after fires, and the inability of reproduction under mature stands, means that *Jack Pine forests can in Nature only be secured by fire.*

Jack Pine is one of the most hardy trees in America. The annual growth after the establishment of the root system is from 1 to 1.5 ft.; this rate holds fairly uniform for about 40 years, after which it steadily decreases, falling to an imperceptible amount at 100 years. Height of growth is a very good indication of soil conditions, for while on fertile soils the mature tree reaches 80 to 86 ft. on poor, wet, cold soils a mature height growth of 60 ft. is very good; the greatest growth seems between the ages of 10 and 20 years. During early youth, because of the density of the stand, the growth goes into height, but once the competition for light is lessened, volume and diameter growth become more prominent. From the 40th to the 70th year the progress is uniform at nearly 1.5 in. per decade. Then it slowly declines and at about 90 years the diameter accretion is practically at a standstill. For a 15 inch. diameter breast-high at 90 years the yield is greatest, amounting in all to 5.4 ties; this suggests that a rotation based on value increment should not exceed 90 years.

1205 BADER. **Cultivation Experiments with Osiers.** (Kulturversuche auf den Versuchsfeldern der K. Moorkulturanstalt, C. Moorkulturstation Moos, b. Gartenbauversuche, C. Dauerkulturen, 3. Korbweiden). *Landw. Jahrbuch für Bayern,* 1 J., N. 3, s. 253-254, München, 1911.

Germany: Bavaria

These are the results of two plantations of osiers in a peaty soil manured with 50 kg. of phosphorus pentoxide and 60 kg. of potash, in the form of Thomas slag and kainit.

Varieties	Crop per acre: cwts.	Crop per are kg.	Height Inches	Height cm.
Salix viminalis purpurea	134	167	86	220
» » *regalis*	151	189	54½	140
» » *cinnamonea*	66	83	39-58½	100-150
» *rubra angustifolia*	52	65	47-51	120-130
» *amygdalina fusca*	70	88	31-58½	80-150
» » *viridis*	56	70	19½-43	50-110
» *purpurea* Schultze	87-120	109-150	39-70	100-180
» » *emendata*	36	45	23½-47	60-120
» *uralensis*	84	105	58½-74	150-190
» *helix*	99	124	62½-70	160-180
» *fragilis trianda*	80-95	100-118.9	51-70	130-180
» *viminalis dasyclados*	34-45	42-56	21-35	54-90
» *dasyclados*	88	110.5	60½	155
» *americana*	102	128	64	165

1206 S. SIRENA. **Vegetable fibre from the Dwarf- Palm, or Chamaerops humilis.** *Boll. del R. Orto Botanico e Giardino coloniale,* Palermo, Anno IX. N. 4, pp. 180-181.

Italy: Sicily Sardinia

Chamaerops humilis is a palm which grows wild in Sicily, and could be cultivated and thus supply an industry contributing to improve the economic conditions of the population.

The geographical area of the Dwarf.- Palm extends along the shores of the Mediterranean; it is common in Northern Africa, from Tripolitania to Morocco, and in the South of Spain as far as Catalonia; it grows on the Riviera, in Sardinia, in some parts of Dalmatia, Albania, at Zante, Corfu, etc.

Chamaerops humilis is easily propagated by seeds and by shoots. The young leaves (*curina*) are submitted to a process which makes them white and elastic, so that they may be used in the manufacture of ropes, baskets, hats, mats, brooms, etc. The older leaves are used for the manufacture of vegetable fibre (*crine vegetale*) and brooms.

The vegetable fibre industry, which does not exist in Sicily, could be greatly developed there.

Mr. Sirena calculates that from one hectare planted with Chamaerops Palm it may be possible to gather leaves sufficient to produce about 31 800 kg. of vegetable fibre, which at the price of 10 to 15 fr. (8/-12/) per 100 kg. would represent a gross income of 3180 to 4770 fr. per hectare. The crop of adult leaves is only made every three years, and, considering that the cultivation, harvest and preparation expenses are paid by the young leaves, it may be considered that the annual income from a hectare would be from 1060 to 1590 fr. (£ 42-8-0 - £ 63-12-0). This income would be all the more appreciated because coming from poor soils, unadapted for other crops (1).

F. A. LEETE. **Forest Railways for the Extraction of Timber in Burma. Double-rail and Mono-Rail.** *The Indian Forester*, vol. XXXVII, No. 182, pp. 34-54 + pl. 2, Allahabad, Jan. and Feb. 1911. **1207**

British India: Burma

A full and detailed comparison between narrow gauge double line railway and the Shrewsbury mono-rail is not yet possible as the latter is still in the experimental stage. The only experiment made so far has been with animal traction of single cars. As soon as the system has been well introduced, it is safe to assume that a locomotive to ride astride the rail will not be long in making its appearance. It will then be possible to form trains and to simplify designs of the cars themselves.

There are certainly some places where the two systems will compete with each other, but the writer is of the opinion that, in many other places, either the one or the other system will have the advantage. The double-rail will prevail over the mono-rail under its present form for long ascents. Also where there is considerable traffic it is likely to be preferred; but for long descents, or on the level, the mono-rail certainly has the advantage.

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(1) In Sardinia the inner part of the stem of the « palmizzo » *Chamaerops humilis* is used as food; it is eaten in a similar way to fennel.

The vegetable fibre from this Palm comes chiefly from Algeria; about 70 000 quintals are imported annually from Algeria into Italy, at a price of 9 to 12 frs the quintal (100 kg.).

V. VILLAVECCHIA, *Dizionario di Merceologia*, Roma, 1911, vol. I, p. 7/9 (*Crine vegetale* (*Ed*).

1208 **Tanning substances in Mauritius.** (Matières tannantes de l'île Maurice). *La Quinzaine Coloniale,* N. 5, p. 161, Paris, 10 Mars 1911. (1).

Mauritius

Apart from the Filao (*Casuarina Equisetifolia*), the Mangrove tree and the Guava tree, the other barks which might be used in tanning are generally poor and valueless. The Mangroves of Mauritius are not so rich as those of Madagascar and the Seychelles, because they are not deprived by scraping of the outer rhytidome (outer dried part); this could be easily accomplished.

1209 G. VERNET. **Length and Frequency of the Incisions on Hevea** (2). (De la longueur à donner aux incisions de saignées et de fréquence des traitements dans l'Hevea). *Journal d'Agriculture tropicale,* No. 117, pp. 73-77, Paris, Mars, 1911.

French Indo China

At present the length and frequency of incisions on Hevea for rubber sap are not regulated in any way. The planters have no clear ideas as to the best method of tapping.

Some experiments have been instituted at the Kuala Lumpur Station with the object of determining the comparative value of the methods most in favour in the Malay Peninsula; but some time must pass before any practical conclusion can be drawn.

The physiological studies undertaken by Mr. Vernet at Suoi-Giao have shown that there is no proportion between the yield and the capacity of the cortical tissue, nor between the yield and the surface of bark utilised. Rubber is a product of the physiological activity of the plant and as it serves in part for nutrition, only that which is superfluous ought to be taken.

It has been proved that the more extended the incisions the more rapid is the coagulation of the latex in the cups; while frequency of tapping decreases the proportion of rubber in the latex.

The writer's hypothesis is that two conditions regulate the rapidity of coagulation in the latex: 1) a long incision cuts through a larger number of cells, whose content in coagulating substances makes the coagulation of the latex more rapid, the coagulation being proportional to the percentage of rubber. 2) When the trees are tapped daily, these coagulating substances are regularly leached out, their proportion in the latex decreases, and coagulation is less rapid.

This hypothesis is in agreement with the results of experience, whence the conclusion may be drawn that too much space should not be left between the tappings.

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(1) Mangrove = *Mangifera indica;* Guava tree = *Psidium guayava L.* Cp. this Bulletin March 1911. No. 871.

(2) Cp. this Bulletin March, 1911, No. 884.

Rubber and Gutta Percha in the German Colonies in 1909-1910. 1210

(Official Colonial Report) (Kautschuk und Gutta-Percha in den Deutschen Kolonien, 1909-1910). *Gummi-Zeitung*, N. 24, p. 881, 17 März, Berlin, 1911.

German Colonies

The year 1909-1910 marked a general increase in the agricultural produce of the German Colonies, especially in the rubber and gutta-percha industry.

German East Africa: The total exportation of agricultural products from this Colony rose to 13 million marks, 7 of which represent produce obtained by the natives. The plantations of Manihot covered 16 212 hectares last year, comprising 14 425 526 trees, as against 12 853 hectares and 12 661 166 trees in the previous year. Some new plantations of *Kikxia* (1) and *Castilloa* have also been made (about 70 hectares). The amount of liana rubber exported was 256 tons, worth 1 650 000 marks. The construction of railways, and some rigorous regulations in regard to the reserve of liana woods will have a great and beneficent influence on future exportation. There is a great future in store for the region of Moschi, where, near Kilima-Njaro, 1200 hectares have already been planted in rubber.

Kamerun: The rubber produced by the natives amounted to 1 517 000 kg., valued at 7 551 000 marks, or an increase in production and value of nearly two thirds over the preceding year. The increase is particularly remarkable in the zones bordering on the French and Spanish possessions. The *Kikxia* comes first; then the lianas. The total area of rubber plantations is 4048 hectares, double that of the previous year. In many plantations cacao is combined with rubber.

Togo: At Togo, rubber cultivation comes after that of the palm and maize, both of which are extensively grown. This explains the decrease in export, although the value has increased in consequence of the increase in price.

The *Manihot, Ficus, Kikxia* and *Hevea* are cultivated on about 160 hectares. The total production, which was only 150 000 kg. of raw rubber, was imported into Germany.

Rubber is not grown at all in German South West Africa.

German New Guinea: In the Bismark archipelago, in the Salomon Islands and in Wilhelm's Land an area comprising 2254 hectares in all, is cultivated in *Ficus, Kikxia, Manihot, Castilloa* and *Hevea*. To encourage the cultivation of rubber, Botanical Gardens have been instituted at Rabaul. The primeval forests of the island contain some gutta-percha trees which the natives have begun to utilise. In the Carolines, the Mariannes and Marshall Islands the cultivation is not progressing. The entire production was exported into Germany; it was 6616 kg. in all, worth 45 746 marks.

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(1) Synonym of *Funtumia elastica*. Cp. *Index Kewensis*. (*Ed.*).

Samoa: The *Hevea* is mainly cultivated in this island, where there are 430 369 plants. There are also more than 36 000 plants of *Castilloa alba* and a number of *Ficus* which serve mainly as windbreaks.

There has been no production so far. The number of rubber plants was increased by 62 000 *Hevea* last year.

1211 M. Paris. **The Rubber Plantations in Indo-China.** (Les plantations de Caoutchouc dans l'Indo-Chine). — *Bulletin de l'Office Colonial*; N. 39, pp. 65-79, Melun, Mars, 1911,

French Indo-China

Indo-China is the first of the French Colonies where important results have been obtained from rubber plantations. This Colony also possesses numerous species growing wild and supplying excellent qualities of rubber (1).

The exportation of rubber for the whole of Indo-China was 31 863 kg., in 1909, representing a value of 207 048 fr., and nearly the whole amount was obtained from tapping wild species.

In Cochin China the wild species are practically not turned to account; but the efforts of the planters have been mainly concentrated in this colony, most satisfactory results having been obtained, on the cultivation of *Hevea Brasiliensis.*

The Chamber of Commerce of Saigon expects that from 1911 to 1920, about 400 000 trees will be planted every year.

The production of rubber at Cambodia has remained in the initial stage. Rubber is one of the principal exports from Laos, but no attempts have been made so far with plantation rubber.

No increase in the production of rubber from lianas is to be expected in Annam, where the number of planters who undertake this cultivation is still very limited. Experiments show that the cultivation of the *Hevea* is not to be recommended, except in the South of Annam.

The greater part of the rubber exported from Tonking is supplied by the tapping of lianas, the chief of which are the following:

Bousigonia Tonkinensis (rosy rubber);
Xylinabaria Reynaudi (abundant latex);

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(1) See this Bulletin Nov. 1910, p. 111 and Dec. 1910, p. 298. (*Ed,*).

Xylinabaria sp. (very elastic rubber);
Ecdysanthera micrantha;
Parabarium Tournieri;
Melodinus Tournieri;
Aganosma harmandiana;
Rhynhodia fragrans;

Only one tree, *Bleekrodea Tonkinensis* (1) gives a product of a very appreciable market value. No definite result has yet been obtained in Tonking from the cultivation of the species introduced.

The cultivation of the *Hevea* alone has given definite and encouraging results in Indo-China at the present time. But it seems that this species should be limited to Cochin-China and South Annam. *Ficus elastica* might give interesting results in the northern provinces.

As for the native species, measures should be taken to preserve the natural plantations from complete destruction.

The Rubber Production in Portuguese East Africa. — *Journal of the Royal Society of Arts.* N. 3044, London, March 24, 1911, p. 491. 1212

Portuguese East Africa: Mozambique

From Laurenço Marques, at the extreme south, to Ibo, at the northern extremity of Portuguese East Africa, *Landolphia* of various species grows in profusion. This plant is extensively exploited from Inhambane, Beira, Qualimane, Moma, Angoche, and Ibo, from the last three through the town and island of Mozambique. South of the Zambezi the *Landolphia* is a vine, sometimes of great length, and, when permitted, it attains the thickness of a man's arm. This vine *Landolphia Kirkii*, is considered rubber-bearing when it reaches half an inch in diameter, and is tapped by a series of long cuts. The flow is more abundant at the end of the rainy season, and owing to the great difficulty of getting at the vines, whose habitat is in the forests, they are tapped but once a year, and then bled for all there is in them. This rapidly reduces the output of a forest, and,

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(1) *Bleekrodea Tonkinensis* occurs sporadically over nearly the whole of Tonking, with the exception of the Delta, but there are also numerous close groves of it. Its habit of growth is similar to that of the birch-tree and it varies in height, from 12 to 20 m. Its root nodosities, which form actual water reservoirs, permit of its supporting long periods of drought.

Cf. EBERHARDT and DUBARD, *L'Arbre à Caoutchouc du Tonkin*, Paris Challamel ed. 1910. (*Ed.*), where supervision of the natives is impossible, the percentage of vines utterly destroyed yearly is very great.

Outside the territory covered by the Mozambique and Buzi companies, the collection of rubber, whether south or north of the Zambezi, is entirely in the hands of natives who collect and sell it to the Indians at the coast.

The best rooty rubber is that coming from the Matadane range, which lies between Moma and the Cocola river on the south, and Talalane and the Larde River on the north. Inferior qualities are gathered farther north, and their principal final exit is at Mozambique, the capital of the district. All Mozambique rooty rubber (and it must be remembered that the name applies only to rubber gathered north of the Zambezi) is marketed in a crude state, containing bark and rubber in almost equal quantities. Owing to the fact that most rooty Mozambique rubber comes from unpacified regions, to which white people have not had access, little was known as to the species of *Landolphia* growing in the district, and it was generally supposed that it was the same as that worked by tapping south of the Zambezi. Recently, however, the American Consul succeeded in crossing the Matadane country, and it was observed that while the plant bearing the rubber is a *Landolphia*, it is very different from the species known south of the Zambezi. The Matadane *Landolphia* has an extensive root system, running near the surface, out of proportion to the plant itself. The latex, which is rich in quantity and of very good quality, is found in the bark of the roots. The installation of simple machinery for cleaning out the bark and eliminating the damaging boiling process will bring Matadane rubber into favour in the market.

Besides the *Landolphia*, an indigenous rubber-bearing tree, *Mascarenhasia elastica*, has been discovered. (1) It yields rubber of good quality, but it is difficult to tap on account of the fluted formation of the trunk; and, as it requires fifteen years to mature, it would be of little value as a plantation tree.

The only plantation tree which has been largely exploited in the province of Mozambique is the *Ceara*, of which over 10 000 trees exist, mostly in small plantations. Up to the end of 1909, these trees had proved a failure and were mostly abandoned; but the visit of an expert on rubber in March 1910, has brought back confidence in the *Ceara* tree, and preparations are under way for extensive and systematic planting. The *Ceara* does well throughout a vast extent of the province, and reaches the tapping stage at the end of three years.

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(1) Cp. this Bulletin, March 1911, No. 883.

1213

H. JUMELLE AND PERRIER DE LA BATHIE. **The Rubber Plants of the South and West of Madagascar.** (Les plantes à Caoutchouc de l'Ouest et du Sud de Madagascar) *L'Agriculture pratique des pays chauds*, IIe année, N. 96, pp. 117-194, Paris, Mars, 1911.

Madagascar

After a detailed description of the flora of West and South Madagascar, the following information is given respecting the utilisation of the different rubber plants of the country:

The « vaheabato » of the natives is a *Landolphia* of a new species, which is confined to the massif of the Isalo. It forms an underwood which is utilised only by the Bara of the neighbourhood, who pound the bark of the stems and roots.

Landolphia sphaerocarpa is common in the basins of the Mangoky and Onilahy.

A *Mascarenhasia* from the Isalo plateau appears to be a new species which has the appearance and habit of *M. lanceolata* of Manongarivo. But the *Mascarenhasia* par excellence of the West, *M. lisianthiflora*, the « guidronosy » of the Bara, is utilised in the same way as the « vaheabato » with the difference, however, that very often the roots only are used.

The rubber of the « guidronosy », prepared by the Bara, is in small thin blackish-red slabs, 7 to 10 cm. square. It is very tough and elastic, but deteriorates easily, perhaps on account of the defective way in which it is prepared.

Cryptostegia madagascariensis and *C. grandiflora* are the « lombiri » of the natives; they are very little used as rubber plants, the latex being employed chiefly as a poison.

Marsdenia verrucosa, or « bokabe » is much more generally employed. A plant furnishes from 20 to 40 follicles, each of which gives an average of 60 centigrams of rubber. A little before they are quite ripe, the fruit, of which there is an almost smooth variety in the West, is gathered and taken to the village, where the women and children cut off the two ends, one after the other, placing them on a sieve, through which the latex runs into a receptacle. The « bokabe » rubber, which is at first tough and of good appearance, rapidly becomes pitchy.

The « vahimainty » or « langałora » is *Secamonopsis madascariensis*, a species of a new genus created by the writers and belonging to the Asclepiadeae. It is a liane with numerous grayish stems from one to four cm. in diameter. The rubber is not very tough except in the large stems and in the nearly ripe fruit.

The natives use the fruit in the same way as that of the « bokabe ». Each follicle will give as much as 75 cgr. of good rubber, and as there are from 100 to 500 of them on each plant, the yield is from 75 to 400 gr. per stock.

The « kompitso » is *Gonocrypta Grevei,* a liane or bush according to whether it finds a support or not. The climbing form is not very productive, and the shrub form is useless.

Euphorbia Intisy, the present habitat of which is in the extreme south of the island only, is becoming gradually rarer. This is the more to be regretted because it is the only southern plant which has a real economic value. Its disappearance is due to the treatment of the natives, who are not satisfied with cutting the trunk without the least care, but also tap the root tubers to which the plant owes its resistance.

1214 **Apparatus for Measuring Rubber Trees.** (Appareil pour mesurer les arbres à caoutchouc). *Journ. d'Agric. tropicale,* No. 117, pp. 94-95, Paris, 31 Mars, 1911.

Ceylon Mr. Burgess published in the *India Rubber Journal* the description of an apparatus which he has invented for measuring rubber plants. It consists of a piece of wood, longer by 15 cm., than the height at which the trees are to be measured. At right angles to this piece of wood and at the measuring height is fixed a strap a little longer than the greatest presumed circumference of the trees.

This strap passes to the left, only a short length of from 12 to 15 cm. (4.6 in to 5.8 in) being left at the right. This short portion is about a centimeter in width, the remainder of the strap being 3 or 4 centimeters (1.1 or 1.5 in) wide, while there is a hole at the end through which a punch can be passed. The inner side of the strap is left rough, the outer part being smooth.

The piece of wood is placed vertically to the tree and the strap passed round the latter, passing again to the right through a cut made in the short end. The strap must previously be covered along its entire length witha slip of paper, fastened down with glue. The native who is in charge fastens the strap firmly, and when it is well arranged on the tree, he pierces the paper through the hole in the strap with the above mentioned punch. Then he passes to another tree. At the end of his round the paper is punctured with holes, which can easily be counted. By their number and arrangement they give the number of trees measured during the day and their circumference.

Fraud is rendered impossible by the circumstance that, amongst a large number of trees, there is a regular progression of trees with a considerably increasing diameter, and then an equally regular decreasing one.

It is easy to count up to 150 holes per inch along the length of the strap, and not more than 2 % of the holes will overlap one another. Mr. Burgess uses 4 of these instruments, with which 174 000 measurements have been made up to the present.

CH. RIVIÈRE. **Slip and Graft Experiments with the Rubber Ficus** (Expériences sur le bouturage et le greffage du Ficus à Caoutchouc). *Journ. d'Agric. Tropicale,* No. 117, p. 91, Paris, March, 1911. **1215**

Java. Algeria

Propagation by layers above ground is a common practice with *Ficus elastica* in Java, where the natural tendency of the tree to shoot forth adventitious roots on the trunk and branches is turned to advantage. This peculiarity has been utilised by Mr. C. Rivière in the Experimental Garden at Algiers to make slips of very large branches and so obtain trees in a short space of time.

If a slip can be obtained with adventitious roots at its base, the slip quickly becomes a tree that can be tapped at an early date.

But it is not often that a mature *Ficus* has many branches which are sufficiently straight and capable of furnishing slips of large growth and with adventitious roots at the base. Mr. Rivière, having observed some cases of the natural union of above-ground roots with the lower branches, has succeeded in applying grafting by approach of roots to branches; and has thus been able to provide the slips he had selected with an artificially produced root system.

The grafting in the open air of strong stocks, and especially of one species on itself, gives sure results.

M. K. BAMBER and R. H. LOCK. **Ceylon Experiments on the Effect of Different Intervals between Successive Tappings in Para Rubber** ***(Hevea Brasiliensis).*** *Circulars and Agricultural Journal of the Royal Botanic Gardens,* Vol. V, N. 9. Ceylon. September, 1910. **1216**

Ceylon

The experiments described in this Circular were designed for the purpose of ascertaining what differences, if any, exist in the quantity, composition, and properties of rubber latex drawn by tappings carried out at different intervals of time. The experiments were made on trees upwards of twenty years of age, which had not previously been tapped with any regularity, and which were beginning to show obvious signs of the ill-effects of close planting.

The following conclusions were reached :

The wound-response, although clearly recognizable, is not nearly so marked as in the case of Parkin's experiments (1).

The greatest increase in the yield of dry rubber was in no case much more than 100 per cent. Taking the first 40 tappings of each series, there is no sensible difference in yield which can be ascribed to the length of the interval between successive tappings. The yield from trees tapped daily and from trees tapped weekly is practically identical for the same number of tappings, both absolutely and in proportion to the area of bark tapped.

During the first few tappings the rate of fall in the percentage of rubber contained in the latex is more or less inversely proportional to the length of the interval between successive tappings, the fall being more rapid as the tappings succeed each other at shorter intervals. Sooner or later a nearly constant percentage composition of the latex is arrived at. This final percentage is lower in the case of trees tapped at longer intervals.

As might be expected from the less concentrated condition of the latex, the proportion of scrap rubber obtained is lower in the case of more frequent tappings.

Mature trees tapped daily for eighteen months continue to afford a profitable yield of rubber. After over 7 lbs of rubber per tree had been obtained in this period, the average amount at the 440th tapping was at the rate of 4 lbs of dry rubber per tree annually. The general appearance of the trees at this time was quite healthy and they showed no signs of having suffered from the severe tapping which they had undergone.

Frequent tappings are therefore to be recommended from a practical point of view as far as mere yield is concerned, but the removal of bark is of course proportionally more rapid. On the quarter system of tapping this is of less importance, and it still remains to be determined whether it would not pay better to tap daily during certain months and rest the trees, or only tap at two or more days interval during the months when the flow is less. The experiments described are still in progress and in presenting their final report, Messrs. Bamber and Lock hope also to make a detailed comparison between yield and rainfall at different seasons of the year.

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(1) Parkin, on tapping 4 trees in 1899, at Peradeniya, found an increase of over 600 per cent at the end of 14 tappings made at intervals varying from 3 to 7 days (average interval 5 to 6 days).

C. C. **The Heveas of French West Africa.** (A propos des Heveas de l'Afrique Occidentale Française). *L'Agriculture pratique des pays chauds,* IIe année, N. 96, p. 249, Paris, Mars 1911. **1217**

French West Africa

Mr. Yves Henry, Director of Agriculture in French West Africa, has informed the authorities at the Colonial Garden that the examination at Kew of some samples of Hevea from the garden of Ebute Meta (Lagos) which were sent under the names of *Hevea brasiliensis* and *H.Spruceana,* has shown that the first is correctly named and that the second belongs to another form of *H. brasiliensis.* This form has hitherto been known as *H. Spruceana* or « Medeiros » Hevea This latter botanical name ought therefore to be suppressed, since *H. Spruceana* is only an interesting variety of *H. brasiliensis.*

P. J. S. Cramer. **The Cultivation of the Hevea.** La culture de l'Hévéa). — *Manuel du Planteur,* 1 vol. Ill. pp. 132, Amsterdam, Paris, 1911. **1218**

Malay Archipelago

This work, which has been translated into French by Prof. E. de Wildeman, deals theoretically and practically with the cultivation of the Hevea.

The manual is in three parts, and describes 1) the establishment of the plantation: preparation of the soil, canals and drainage, cultivation of young Heveas, position of plants, etc.; 2) maintenance of the plantations: care of the soil, catch crops, growth, pollarding and pruning, diseases and pests; 3) tapping: the practice of tapping, instruments, housing of the produce, preparation of the rubber. There are 40 illustrations, and the book is arranged to serve as a planters' manual.

***Funtumia Elastica* at Martinique.** (La *Funtumia elastica* à la Martinique). (*La Quinzaine Coloniale,* N. 7, p. 241, Paris, 10 April 1911. **1219**

Martinique

In the cultivation trials with rubber trees at Martinique, *Hevea* and *Castilloa* have not given good results. *Funtumia elastica,* on the other hand, was very satisfactory.

There are 60 000 plants in the nurseries of the Colony gardens. The Chief of the Agricultural Department advises the direct sowing in forests, which would form one of the best kinds of reforesting.

Rubber Plants on the West Coast of Mexico. (Kautschukbäume an der Westküste von Mexico). *Gummi- Zeitung*, N. 25, s. 427, Berlin, 24 März 1911.

Mexico: Sinaloa, Tepic

There has been a mistaken impression that certain rubber plants called « Palo Amarillo » which give a very small quantity of rubber, abound on the Pacific coast of Mexico ; but it is, on the contrary, the « Palo Colorado», also called « Chilte », which is to be found there, and it gives a plentiful supply of an excellent rubber. An analysis of its latex has given 37 % of dry rubber. At Sinaloa and Tepic, 20 tons were collected in two months.

Another tree, similar to this, from which it differs only in colour — the « Copalillo » — grows in the valleys, whereas the « Palo Colorado » grows on the mountains. The latex of « Copalillo » gives 52 % of dry rubber.

These plants grow in large numbers in the wild state at Sinaloa and Tepic.

1221 **A New Rubber Plant.** (Nueva planta que produce Hule). *El Haccendado Mexicano*, vol. 9, p. 116, Mexico, 10 Marzo 1911.

Mexico: Sinaloa

The plant known under the name of *Clavel de España*, which abounds in the district of Rosario and in a large part of the State of Sinaloa, is being specially studied at present, because its latex produces a rubber of the first quality.

This plant is particularly plentiful on the mountains of the Alcadia of Matatan. The Government of Sinaloa has exhibited at the Prefectures some rubber obtained from the latex of the *Clavel*, and it is hoped in Mexico to obtain as satisfactory results from this plant as from the *Guayule.*

1222 **The Muliya Rubber Tree of Rhodesia.** — *The Rhodesia Agricultural Journal.* Salisbury,. February, 1911.

Rhodesia

Two samples described as rubber were received from the Administration of North-Western Rhodesia under the native name of Muliya. Specimens of the tree from which the rubber was obtained were also forwarded for determination, and on examination in the Botanical Laboratory, the Muliya tree proved to be identical with the so-called Rhodesian rubber tree « M'toa Ungamamasane » (*Gouioma Kamassi*) order *Asclepiadaceae.*

The M'toa tree is widely distributed throughout Southern Rhodesia, and enquiry is sometimes made as to whether the latex might not be of some commercial value. The Imperial Institute, South Kensington, London, has drawn up the following report.

Muliya Rubber, N. 1

	In material as received	Composition of dry material
Moisture	25.5 %	—
Caoutchouc	21.9 »	29.4 %
Resin	46.2 »	60.7 »
Proteids	1.9 »	2.6 »
Insoluble matter	5.5 »	7.3 »
Ash	1.0 »	1.3 »

The material described in the above table as *caoutchouc* was left after extracting the resins with acetone; it consisted of a blackish, slightly sticky, rubber-like substance, which was fairly tenacious but possessed little elasticity. Material of this type would have very little, if any, commercial value.

Ai Camphor Production in Burma. (Kampfergewinnung in Birmannia). — *Osterreichische Monatschrift für den Orient*, Wien, Feb. 1911. 1223

Burma.

The production of Ngai-or Ai-Camphor is continually progressing in Upper Burma. The plants of *Blumea Balsamifera*, which are very numerous in the woods of this region, are mainly utilised for the production of camphor and the oil of camphor. The natives do not concern themselves with camphor, however, except when they have nothing better to do.

O. Sperber. **The « Chicle » Gum and its Production.** (Das Chiclegummi und dessen Gewinnung). — *Der Tropenpflanzer*, 15 J., N. 4, pp. 220-223 fig. 1, Berlin, April, 1911. 1224

United States Mexico Central America

The « Chicle » gum was introduced into the United States in 1876, where it is very largely consumed at the present day; it is used in the preparation of chewing gum.

« Chicle » gum is extracted from the thick juice of the « Chicle-zapote » tree (*Achras Sapota*, Linn.), which is rich in sweet matters.

This plant is a native of Mexico and Central America; there are important plantations of it in the States of the South of Mexico. It grows to a height of from 13 to 17 m. (from 42 to 55 ft) with a diameter of from 87 (34 in) to 115 cm. (45 in); a tree of these dimensions produces from 13.5 to 16 kg. (or 29.7 lb to 35 lb) of « Chicle » gum per year.

The wood of the tree is a fine redbrown ; it is adapted to different purposes and is easily mistaken for mahogany.

The fruit, which is called « Sapodilla » is very much appreciated, but it has almost completely disappeared from the Mexican markets, because the collection of the sap interferes with the production of the fruit.

The sap is collected all through the year, with the exception of the 3 or 4 rainy months; it is obtained by means of incisions made at the fork. It is fluid and milky as it comes from the tree, and is afterwards condensed by heating in boilers, and exported.

A good « Chiclero » will produce from 225 to 270 kg. (or 495 lbs to 594 lbs.) of « Chicle » gum, of the value of from 34 to 37.50 fr. (or £ 1.7.2½ to £ 1.10). The sale price per « quintal » of 45 kg. varies from 125 to 137.50 fr. (or £ 5 to £ 5-10s), while the cost price is about 50 fr.

Most of the gum is exported to Canada, where it is dried, in which operation it loses 50 % of its weight. It can be sent into the United States more profitably after being prepared in this way, because it has to pay a high customs duty there.

The importation into the United States, which was only 416 000 kg. (or 915 200 lbs) in 1885, with a value of 768 000 fr. (£ 30 720) had risen to 2 352 000 kg. (or 5 174 400 lbs) in 1909, worth 10 431 000 fr. (£ 417 240).

Since there is such a large and increasing consumption of this gum, the cultivation of the « Chiclezapote » has to be considered. The trees are planted at intervals of 3 m. 30, which gives 1000 trees per hectare (404 to the acre) ; it is calculated that a tree of from 8 to 10 years, of a diameter from 30 to 38 cm., (or 11 in, to 14 in.) will produce on an average from 2.27 to 2.7 kg of gum., or from 5 lbs to 6 lbs.

The most suitable soils for this cultivation are good, deep, calcareous clay soils, for which the price has risen from 15 to 75 fr. per hectare. The rainfall required is about 2250 mm.

It is expected that this cultivation will give rise to a speculation movement, similar to that which occurred recently in the case of the rubber plantations in Mexico.

Live stock Breeding. — Aviculture. — Beekeeping. Silk-Production — Animal Industries.

The Control of Bovine Tuberculosis. Report of International Commission; *Department of Agriculture,* Ottawa, Canada, pp. 29. **1225**

Canada

This pamphlet constitutes the first report of the International Commission on Bovine Tuberculosis, appointed by the American Veterinary Medical Association at its annual meeting in 1909, to study the problem of tuberculosis among cattle and to report upon reasonable and practicable methods or systems to be recommended to officials and live stock owners for eradicating the disease. The conclusions reached are presented with a view of crystallizing public opinion and so clearing the way for legislative action. Resolutions that are to be presented to the American Veterinary Medical Association have the following titles: Dissemination, Tuberculin Test, Evidence from Tuberculin Test, Compulsory Notification, Localization after slaughter, Disposal of Tuberculous Animals, Prevention, Control of Tuberculin Test, Education, Publicity, Legislation, Sanitation, Immunization, Animal Tuberculosis and Public Health.

Five appendices give the reports of the committees on education and legislation, localization of tuberculosis, dissemination, disposal of tuberculous animals and the plan adopted by the Commission for dealing with tuberculous animals,

E. B. HART, E. V. Mc COLLUM, AND J. G. FULLER. **Studies on the Nutrition of Animals.** (Twenty-fifth and Twenty-sixth Annual Reports of the Agric. Exper. Station of the University of Wisconsin) — *The Rôle of Inorganic Phosphorus in the Nutrition of Animals.* Research Bulletins. 8vo, pp. VII + 52 + 228. No. 1. (p. 1-40) Madison, 1910. **1226** (1)

United States: Wisconsin

The problem was to determine whether inorganic phosphates, such as di- and tri-calcium phosphates, could take the place of organic forms of phosphorus in a ration for growing swine.

In the experiments 5 lots of pigs were used. Lot 1 received the basal ration (rice, wheat-gluten and bran from which the phytin had been removed by washing). Lots 2 and 3 received the basal ration and in addition different amounts (40 and 20 gr. per pig daily) of precipitated calcium phosphate (consisting of 70 % di-calcium phosphate and 30 % tri-calcium phosphate). Lot 4 received a ration composed of rice, wheat gluten and whole bran. Lot 5 was fed a standard ration for growing pigs, consisting of corn, oats, wheat middlings and oil meal.

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(1) Numbur 1226 and 1227 in the French Bulletin for April 1911.

The results may be summarized as follows :

1) On the standard ration extremely low in phosphorus, pigs made as large gains (up to 75 or 100 pounds, when starting at weights of from 40 to 50 pounds) as animals receiving an abundance of this element. After reaching this point, loss of weight began, followed by collapse.

2) Animals fed on a low phosphorus ration, supplemented with inorganic phosphates, made as vigorous a development as others receiving their phosphorus supply wholly in organic form.

3) Precipitated calcium phosphates gave no better results than did floats, a crude tri-calcium phosphate.

4) Phytin, as a supply of phosphorus, gave no better results than the inorganic phosphates.

5) Animals on the low phosphorus ration maintain the proportion of calcium and phosphorus (in the principal organs and tissues) constant and comparable to that of normally fed pigs.

6) The percentage of ash in the skeleton of pigs on the depleted phosphorus ration was reduced to nearly one-half that of pigs receiving a normal ration, or a ration poor in phosphorus but supplemented by an inorganic phosphate.

7) This marked reduction, together with the ability of the animal to build up a skeleton very rich in calcium phosphate when an abundance of the latter is supplied in organic forms, strongly points to a synthetic power possessed by the animal, which enables it to convert inorganic forms of phosphorus into organic forms.

8) When the animals were starving for want of phosphorus, they drew this element from the skeleton, but removed calcium and phosphorus in the proportions found in the tri-calcium phosphate.

9) The daily phosphorus supply for a 50 pound (22 ½ kg.) growing pig should be at least 3 grams. A supply of 4 to 5 grams is probably a safer quantity.

1228

E. B. HART, E. V. Mc COLLUM and G. C. HUMPHREY. **The Ash Constituents of Wheat Bran in the Metabolism of Herbivora.** — *Twenty-fifth and Twenty-sixth Annual Reports of the Agricultural Station of the University of Wisconsin.* Research Bulletin No. 5, p. 173-188.

United States: Wisconsin

In a previous publication (1) it has been shown that wheat bran contains phytic acid in combination with potassium, magnesium and calcium.

This investigation was undertaken to study further the action of the components of the phytin complex when administered separately as salts, their channels of excretion and general relation to the phenomena of constipation and diuresis, with the consequent effect on milk secretion.

The principal conclusions arrived at may be summarized as follows:

1. When calcium or phosphorus were deficient in quantity in the food, the skeletal tissues appeared to be ready sources of supply. The average quantities of calcium oxide and phosphorus pentoxide metabolized and excreted daily by the experimental cow (a vigorous pedigree Holstein), during periods of deficient supply, were respectively 50 and 60 grams.

2. Variations within wide limits in the form and quantity of supply of potassium, magnesium or phosphorus, did not influence the percentage content of these elements in the milk.

3. With the cow experimented upon there was no appreciable fluctuation in the percentage of organic constituents in the milk relative to the supply of phytin.

4. Marked diuresis was produced by the quantity of phytin supplied. A high potassium and magnesium intake as sulphate and chloride produced an effect similar to that of potassium alone when supplied as chloride. This would indicate that the high potassium intake accompanying the whole bran ration was responsible for this phenomenon.

5. The channel of excretion of phosphorus, calcium and magnesium especially and a part of the potassium, when supplied in wheat bran, is by way of the gut.

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(1) *Jour. Amer. Chem. Soc.*, 1904, 31: 564.

1229 P. Wauters. **The Feeding of Animals in Regard to the Increase of the Fatty Matters in Milk** (Peut on augmenter la teneur du lait en matières grasses par l'alimentation des animaux?). — *Laiterie et élevage*, Louvain, 15 Fév., 1911, N. 4, pp. 29-31, 1 Mars, 1911. N. 5, pp. 35-37.

Belgium. France

There is no question relating to the production and composition of milk which has been more discussed than that of the effect of feeding on its fat content. Contrary to the opinion generally held by farmers and dairymen, experiments show that diet has but very little influence on the composition of the milk. This is the conclusion reached after 20 years' regular examination of the milk from each of the nine cows belonging to Mr. Wauters and kept on special diet; and it is confirmed by all the literature on the subject. It may be said that the varying proportions of the fat content of milk are much more a question of breed or individual than of feeding.

Recently in France, the practice called *le mouillage au ventre* (1), or over feeding milch cows with sloppy foods has been condemned as a frandulent practice, which contributes to deterioration of the quality of the milk. It is hoped that experiments will be made on a large scale, in various countries and for a sufficiently long time, in order to verify exactly the influence of diet on the fat content of milk.

1230 F. G. Hing. **Seleet and Breed for Baby-Beef Type.** — *American Agriculturist.* New York, February 18, 1911.

United States: Indiana

The best method of disposing of the vast amount of roughage (2) produced on the farm is causing more thought than any other problem that now confronts the feeder. Since to raise a steer from birth to two years of age on high-priced land is undoubtedly an economic waste, the only solution is to make the cattle fat while young.

Calves can be fattened at $ 1.35 per hundred-weight (1 cwt. = 50.8 kgr.) cheaper than yearlings and $ 1.65 cheaper than two-year-olds.

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(1) This practice consists in giving milch cows a watery diet, the object being to stimulate the production of a larger amount of milk, which is then supposed to contain less fat. (*Ed*).

(2) *Roughage:* any rough material, as straw for bedding animals, a term locally used in the U. S. (*Standard Dict.* Ed. K. Funk. London, 1910. (*Ed.*).

The subject of baby beef, which means the selling of cattle at the age of 12 to 25 months and weighing 800 to 1200 lbs (360 to 540 kgr.) has been discussed and recommended very strongly, but the professional feeder continues to buy older cattle and get them off his hands in one season. But it is the breeder, and not the professional feeder who must put the production of baby-beef on a firm and permanent basis.

The trials of age made at Purdue (Indiana) have given the following figures:

Effect of Age on Cost and Rate of Gain.

	Calves	Yearlings	Two-year-olds
Length of feeding-period . . .	270 days	200 days	180 days
Initial weight	479.9 lbs.	820 lbs.	1033.4 lbs.
Final weight	1010.8 »	1265 »	1484 »
Total gain	513.9 »	445 »	450.6 »
Average daily gain	1.89 »	2.23 »	2.50 »
Cost per 100 lbs. gain	$ 7.74	$ 9.09	$ 9.37

In the above table, maize is reckoned at 50 cents per bushel, cotton seed meal at $ 28 per ton, clover hay at $ 8 per ton, and maize silage at $ 2.50 per ton.

The calves that were used in the comparison of ages noted above, were of a very high-grade Hereford breed and they required 270 days to finish, while the two-years-olds, of rather plain breeding but mature, became fat in 180 days. As long as cattle can be secured which will fatten in six months with practical certainty, the feeder will not use young cattle which take three months longer to fatten and offer no certainty as to whether they will finish uniformly or even get fat at all. Last fall, hundreds of range-bred calves were shipped into the maize belt at a cost of from $ 25 to $ 30 per head.

Before baby beef production becomes a general practice cows that are poor producers must be eliminated. A cow that will not produce a calf capable of being made into a fat marketable animal by the time it reaches the age of 15 to 18 months, and at the same time produce enough milk to help it reach its early development, must be eliminated and be replaced by a cow that will. One of the principal objections to raising one's own cattle on a farm is the necessity of keeping high-priced land in pasture to support the cows. With modern silage methods it is possible to keep a breeding cow for the six winter months on the product of three fourths of an acre of land, while the summer pasture would require about one and a hal to two acres of the same kind of land.

Thirty-five pounds of maize silage and five pounds of clover hay daily will not only maintain a cow at the same weight but will keep her in good condition and let her furnish enough milk to grow the calf into excellent baby-beef. By extending the use of silage into the summer, as many dairymen have done, it is possible to reduce greatly the area required for pasture; and by using silage the entire year, to keep one cow a year on the silage and clover produced on 1 ½ acres of land. Many dairymen have found it possible to produce enough roughage on one acre to keep a cow a year.

When, by the use of silage during the entire year, and only a small amount of pasture, a $ 25 calf is produced on 1 ½ acres, baby-beef production must come to be popular and will make for a permanent live stock industry (1).

1231 A. CHIESI. **Margarine added to Milk for Fattening Calves.** (Il latte margarinato nell'ingrassamento dei vitelli). — *L'Industria lattiera e zootecnica*, anno IX, N° 9, pp. 121-122, Reggio Emilia, 15 Aprile 1911.

Italy: Emilia

The use of margarine as a cream substitute in skimmed milk appears to give good results in the fattening of calves. The following data are from an experiment made by Mr. Chiesi; margarine was used at 3 % by weight, i. e. about 5 $^{1}/_{2oz}$ par gallon.

INCREASE OF WEIGHT IN SIMMENTHAL CALVES.

Date of commencement of experiment	Sex	Age	Initial weight	Duration of feeding	Weight at end of experiment	Total increase in weight	Daily increase in weight
		Days	kg.	Days	kg.	kg.	kg.
February 8	m	37	86	12	95	9	0.750
» »	m	36	65	23	89	24	1.043
» »	m	36	65	52	123	58	1.115
» »	f	14	52	54	89	37	0.685
» »	m	7	43	54	95	52	0.963
March 11	m	14	66	26	86	20	0.776
March 29	f	21	54	8	65	11	1.375

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(1) Compare with K. J. J. MACKENZIE. *Baby Beef. The Journal of the Board of Agriculture*, London, June 1910, XVII, p. 177, abstracted in the publication of the Intelligence Office of the International Institute of Agriculture: *The Science and Practice of Farming during 1910 in Great Britain*, page 524. *(Ed.)*.

Average increase per calf per day, 0.957 kg. (= 2 lbs. 1 3/4 oz).

Milk given per kg. of increase, 10.440 litres (= 1.04 gall. per lb. increase).

ECONOMIC RESULTS.

Expenditure and Returns	Debit	Credit
	Frcs.	Frcs.
Whole milk given 4.32 qs. at 13 fr.	56.16	—
Oleomargarine 66.20 kg. at 1.50 fr.	99.30	—
Total increase of weight, at the average price of 1.60 fr. per kg., 211 kg.	—	337.60
Total.	Fr. 155.46	Fr. 337.60
Net profit	Fr. 182.14	—
Balance	Fr. 337.60	—

Skimmed milk supplied, 22.1 qs. (= 488 galls).

Price realized for the skimmed milk, 8.27 fr. per quintal (= 1/6 per gall). (1).

1232 A. GOUIN and P. ANDOUARD. **Raising Calves on Skimmed Milk with Cassava Meal.** (Elevage des veaux à la farine de Manioc). — *Journal d'Agriculture pratique,* N. 11, pp. 332-355. Paris, 16 mars, 1911.

France

Messrs Gouin and Andouard have tried substituting cassava meal for potato starch in the raising of calves on skimmed milk and starch. The meal is much cheaper, and while its content in nutritive substances is equal to that of potato starch, it has been found on trial to be much easier of digestion. The cassava should be steeped in tepid water for a certain time.

Cooking does not coagulate it as it does starch, but softens it and allows it be be easily mixed with milk: 60 gr. of cassava may be used to each litre of skimmed milk. The calves must be fed for a week on pure cows' milk before being put on this diet.

This artificial feeding is not as good as with whole milk, because a litre of skimmed milk with the addition of 60 gr. of cassava is equal to only $^3/_4$ of a litre of pure milk. Calves for slaughter which are fed in this new way are a little lacking in fat, and they fetch 5 centimes per kg. live weight less than the naturally fed calves. The artificial feeding, however, has no disadvantages for breeding.

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(1) This is the price realised for the skimmed milk in the veal produced taking no account of labour and other expenses· (*Ed.*).

The system has its advantages in both cases. A calf of 50 kg. must consume 500 litres of pure milk in order to attain a weight of 90 kg. The butter value of these 500 litres is 50 fr. The price of 30 kg. of cassava, added to 500 litres of skimmed milk is 9 fr. The difference between these two prices, that is, 41 fr., divided into the total weight of 90 kg., is 45 centimes per kg.; and as the depreciation in the sale is only 5 centimes per kg., there is still a gain of 40 centimes per kg. in the case of the artificial feeding.

1233 A. D. EMMETT & E. C. CAROLL. **Protein in Animal Nutrition. A Study of the Physical Constants of Fats from Swine.** Proceedings of the American Society of Biological Chemistry. — *The Journal of Biological Chemistry.* Vol. IX. No. 2, pp. XXIII-XXV. Baltimore (Hd.) April, 1911,

United States Berkshire pigs of known pedigree and age were fed on different amounts of a highly nitrogenous blood-meal. In conjunction with this a basal feed of ground maize was used. Further, crude calcium phosphate was so fed that all the animals got approximately the same amount of phosphorus in the ration. Nine pigs were used, divided into three lots of three. Lot I was on the low protein plane; Lot II, on the medium, or balanced plane; and Lot III on the high plane.

At the slaughter test it was found:

1. If pedigree, age and type of the animals are not considered in comparing the data, the different amounts of protein feed have no apparent influence on the physical constants of the fats. Individual temperament of the animals may be a factor as great as that of feed, or greater.

2. If litter mates be compared, the differences in the physical constants due to feed are very slight. Here, however, the matter of individuality again may be the controlling factor.

3, If the data from the various samples be compared with respect to the kind of fats, they show that the values for the iodine number and melting point of the back fat are quite different from those of the leaf and composite samples of fat.

4. Comparing all samples of fat (in respect to both the protein-feed and the kind of fat and without regard to pedigree, age, and type of the animal, or to individuality), the specific gravity, saponification number, the insoluble acids and the index of refraction appear to be practically constant in each case.

1234

P. CHAVAN. **New Estimate of Fodder Values.** (Nouvelle estimation de la valeur des fourrages). — *La Terre Vaudoise*, 3^e année. No. 16, pp. 167-169, Lausanne, April 22, 1911.

Switzerland

Mr. Chavan sums up the advantages of Kellner's new method of estimating feeds, based on the « starch value » and the « digestible protein » (1).

Basing his conclusions on this method, he has calculated the value of some food stuffs which are on the market, and tabulates as follows the figures, as far as the present market price in Switzerland is concerned :

	Market Price per 100 kg. Fr. (2)	Estimated Value per 100 kg. Fr.	Difference
Wheat	22 —	17.81	— 4.19
Rye	20 —	17.80	— 2.20
Oats	19.25	14.95	— 4.35
Barley	21 —	16.94	— 4.06
Maize	19 —	20.12	+ 1.12
Bran	16 —	11.01	— 4.99
Potatoes	14 —	4.57	— 9.43
Straw	7.50	1.31	— 6.19
Rice flour	15 —	16.89	+ 1.89
Feeding meal	22 —	18.40	— 3.60
Hay	7.50	5 —	— 2.50
Husked groundnut oil-cake	18.50	22.50	+ 3.70
Ditto, 2nd quality	17 —	21,26	+ 4.26
White sesame oil-cake	16 —	19.78	+ 3.78
Poppy oil-cake	15.50	18.02	+ 2.52
Coprah »	15.25	19.26	+ 4.41
Linseed »	25 —	19.41	— 5.59

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(1) See KELLNER. *Die Ernährung der landw. Nutzthiere.* (*Ed.*)

(2) 100 kg. = 220 lbs; 1 fr. = 10 a.

These few figures show the advantages of oil-cake over other feeding-stuffs; their value is much above the market price. Maize and rice flour are also very cheap; while barley, oats, hay and fodder meal are fairly dear. On the other hand, it is evident that price is not the only thing to be considered in choosing rations. There are a number of other points to be borne in mind: the volume of the ration, the relation between the quantity of hay and that of other foods, the nature and age of the stock, their state of health etc. But these data may be taken into consideration to a certain extent in the choice of commercial feeds.

1235 L. Vuaflart. **The Toxic Qualities of Colza Oil Cakes** (Sur la Toxicité des tourteaux de Colza). — *Journal d'Agriculture pratique*, No. 12, pp. 364-366, Paris, 23 Mars, 1911.

France The seeds of Cruciferae, such as black mustard (*Brassica nigra*), charlock (*Sinapis arvensis*), the Colzas, etc., may in the presence of water, produce irritating compounds resulting from the action of a soluble ferment, myrosine, on a glucoside, myronate of potash. These compounds are formed of isosulphocyanate of allyl more or less mixed with sulphide of allyl. They remain in the oil-cake, and may cause injury to cattle. Mr. Vuaflart has endeavoured to estimate the amount in the various oil-cakes. Black mustard, the exotic Colzas, Yamba (*Eruca sativa*), are recognised as unsuitable for food. The native Colza, which is frequently used, gives rise at times to mischief, of which the exact cause is not yet known; Mr. Moussu is of opinion that, in certain cases, more of the toxic substance is produced in the stomach than in the laboratory experiments.

It is recommended that not more than from 2 to 3 kg. (4 to 6 lbs) of colza cake should be given to a fattening ox. Care should be taken not to let this fodder get damp; it should be boiled or have boiling water poured over it. Moisture, in fact, causes the formation of the deleterious compound, while treatment with boiling water stops its development, the active enzyme being decomposed by boiling.

Estimating the amount of the toxic substance it may be seen which oil-cakes are to be considersd poisonous. Such cakes should either be rejected, or boiled before use; while cakes which contain little, of the acrid substances should be given sparingly and only to a few animals at first.

1236 I. H. SKINNER and W. A. COCHEL. **Steer Feeding. Influence of Age on the Economy and Profit of Feeding Calves, Yearlings and Two-year-olds.** — *Purdue University Agricultural Experiment Station*, Bull. No. 146, pp. 599-608, Lafayette Indiana, June 1910.

United States

At the Agricultural Experiment Station of Purdue University, experiments carried out on the influence of age on the economy and profit from feeding calves, yearlings and two-year-olds led to the following conclusions:

1) The initial cost per hundred pounds weight of calves is greater than that of older cattle.

2) The length of time necessary for finishing steers decreases as their age increases.

3) The rate of gain and the cost of gain increase with the increased age of the cattle.

4) The amount of rough fodder and concentrated food consumed increases with the increased age of the cattle.

5) The amount of extra food necessary for finishing cattle of equal condition decreases as their age increases.

6) The difference in total quantity of feed necessary for finishing cattle of different ages and fed to the same marketable finish is negligeable.

7) The average margin required between buying and selling prices to prevent loss was $ 1.60 (1) per hundred pounds on calves, $ 1.71 on yearlings and $ 1.55 on two-year-olds; the margins secured on a stationary market were $ 2.02 on calves, $ 2.22 on yearlings and $ 2.09 on two-year-olds, resulting in a profit of 42 cents per hundred pounds on calves, 51 cents on yearlings, and 54 cents on two-yearolds.

8) The increase in live weight necessary to make calves prime was 103 %; yearlings, 54 % and two-year-olds, 43.0 % of their initial weights at the beginning of the feeding period.

9) At a uniform price for feeds, the difference in cost of gains between calves and yearlings was $ 1.35; between yearlings and two-year-olds, 28 cents per hundred pounds.

10) The experienced farmer who *feeds* cattle should handle older cattle in preference to calves; while the farmer who *produces* and *finishes* his own cattle may find calves preferable.

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(1) $ 1 = 4 sh.

1237

MARÈS, **The Present State of Stock Raising in Algeria, and its Future** (L'Elevage en Algérie, son état actuel, son avenir). — *Bulletin Agricole de l'Algérie et de la Tunisie*, N. 5, pp. 101-116, Alger-Mustapha, 1er Mars, 1911.

Algeria

In Algiers in 1907 there were:

Sheep	8 799 000
Oxen.	1 078 000
Goats.	3 959 000
Dromedaries	201 000
Pigs	96 000

The dromedaries are entirely in the hands of the natives of the south (1).

The pigs are raised exclusively by Europeans, and the supply is less than the demand. Tunis annually exports 3000 pigs into Algeria.

There are a few cross-bred Algerian goats which mature early and are very easy to fatten, but are poor milkers; they are the descendants of Angoras imported at Mondjebour. The dairymen keep some herds of goats of Spanish origin outside the towns in the district of Oran. In the districts of Algiers and Constantine the goats are of Maltese origin. The indigenous goats belong almost exclusively to the natives. There is very little exportation of goats from Algiers.

There are three distinct groups of sheep. The breed of the oases is of very little value for meat, and of even less use for wool. The Barbary sheep are mainly found in Tunis, and are of very little interest. The contrary is the case with the Berbers; two principal divisions must be recognized amongst the numerous varieties of these sheep; that of the East or Chellala, and that of the West or Tiaret.

The Chellala has a white head and is often hornless; its wool is short and thick; it is tall, and gives from 18 to 22 kg. of meat. The Tiaret is thicker-set than the preceding, shorter in the legs, and is considered thriftier and hardier. Its wool is very similar to that of the Merino. The Algerian breeder has no means at present of judging of the superiority of one cross over another. The Agricultural Associations would do well to procure some stud animals and start experimental herds.

In Algeria, cattle raising is both stationary and nomadic. In the Tell, the animals are put under shelter at night; but this is never done on the borders of the Tell and on the plateaus.

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(1) In 1908 there were in Algeria 236 168 horses, 187 714 mules, 271 794 asses, 204 715 camels, 1 092 202 cattle, 9 632 177 sheep, 4 199 096 goats, and 1 092 202 pigs. Wool-clip in 1908, 410 255 cwts. *The Statesman's Yearbook* for 1911, p. 797. (*Ed.*).

The exports are increasing. From 987 000 head of cattle exported in 1890, the number has risen to 1 246 000 head in 1910. The numbers of the Algerian herds, on the contrary, remain stationary.

Among the measures which are likely to develop sheep-raising are the arranging of watering places, the opening of wooded lands for pasture during dry seasons, the restoration of the perennial pasturages of the south by stopping access to them during years of abundance, and lastly, the prohibition to export ewes for a certain number of months in summer and autumn.

The Algerians have two breeds of oxen, the Gulema and the Moroccan. The Gulema are excellent animals for slaughter; said to be regular miniature Shorthorns. The average weight of the oxen is 250 kg. and they are very thrifty. The Moroccan breed, which is a little heavier, and taller than the Gulema, is very similar to the Spanish breed, with which it is frequently crossed in the district of Oran.

The Algerian cattle are inferior to what they were fifteen years ago. The present herds number somewhat less than 1 100 000 head. Algeria receives yearly from 4000 to 5000 head from foreign countries.

In order to improve the Algerian cattle breed, it should be crossed with the Zebu. The hybrid Zebu is immune from summer diseases; it is hardy, drinks little, and is satisfied with dry and rough food, fattening even on stubble; it matures earlier than the native breed, which has a finer skin and lighter frame; it is more agile and quicker, and of a better build than its parents.

W. J. RUTHERFORD. **Classification for Horses.** — *Bulletin* No. 2. *University of Saskatchewan, College of Agriculture*, Saskatoon, Saskatchewan, Canada, pp. 47, illustrated. **1238**

Canada: Saskatchewan

This Bulletin has been prepared to assist in bringing about a fuller and perhaps better understanding amongst horsemen as to the proper classification of horses for exhibition and sale. The requirements of a choice horse are described under the headings: Conformation, Type, Constitution, Quality, Disposition, Carriage and Action, Manners, Soundness, Age, Color, Sex and Condition.

Descriptions are given of horses of the following classes: Draft, Agricultural, Farm Chunks (1), Carriage Horses, Road Horses, Saddle Horses and General Purpose Horses. Photo-engravings are shown of typical specimens of each of the classes described.

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(1) Chunk, figuratively a small and thick-set beast. (*Ed.*).

1239 H. R. Smith. **Economical Beef Production.** — *The Farmer's Advocate.* Vol. XLVI No. 95. p. 222, Feb. 9, 1911. London, Ontario.

Uni'ed States: Nebraska

The Nebraska Experiment Station has just issued Bulletin 116 which includes the results of several experiments in cattle-feeding. Part I deals with food stuffs as affecting economy of production, while Part II concerns the individual gaining capacity of animals representing different types.

In two experiments, a comparison was made of wheat, bran, linseed meal, and cotton-seed meal as protein supplements. The principal part of the ration was composed, in the first experiment, of a mixture of whole Indian corn and meadow hay, and in the second of whole Indian corn and green corn.

It was found that linseed meal is more nutritious than cotton meal, at equal weights, while bran has only half the nutritive value. The best results were obtained where lucerne hay was used as part of the fodder to furnish the desired amount of protein. The cost of the lucerne hay was 13 dollars per ton, and of the cotton meal 30 dollars per ton.

In a third experiment, cold-pressed cotton-seed cake was substituted for the cotton-seed meal, and the results were favourable for the cotton-seed cake, though the profits were higher with lucerne, 6.87 dollars per head with the former and 8.16 dollars with the latter. The quality of the meat produced ou the several rations was in favour of the lucerne as compared with the commercial protein foods.

Three experiments were made to determine the most profitable proportion of Indian corn to lucerne.

When Indian corn is worth from 35 to 50 cents per bushel, and lucerne not more than 7 dollars per ton, approximately half a feed of Indian corn — 10-12 lbs — will produce more profitable gains, if a good quality of lucerne is liberally given; in fact all will be consumed. This presupposes the steers being in fair condition, and a few weeks extra being given, in order to attain the desired finish.

In the last two experiments, individual records were kept in groups of 6 steers each, in order to study the build and quality of the animals from the point of view of profit, and very careful measurements were made of the animals used.

It was found that depth of body and size of middle girth were the chief factors determining the daily gains.

A difference in gains of not less than six-tenths of a pound per day, was found in all groups, the steers of a given group being fed alike.

Almost without exception, the largest gainers were large and roomy in the region of the paunch, and, usually, also large in heart-girth.

These experiments prove that there is great variation in the fattening capacity of cattle, and it is hoped that by following up this work, some conclusions may be arrived at as to the relation of external conformation to gaining capacity, in order that the most economical types may be selected.

E. IWANOFF. **A New Breed of Cattle** (Fertilité des hybrides de *Bison americanus* and *Bison europaeus*). — *C. R. de la Société de Biologie*, T. LXX, N. 14, pp, 584-586, Paris, 14 Avril, 1911, **1240**

Russia Some experiments in hybridization which have been carried out in Mr. Falz-Fein's Zoological Park, give hope of the creation of a new, stable, and fertile breed of cattle from the half-blood hybrid *Bison americanus* × *Bos taurus*, which is strong and capable of working faster and with less fatigue than the ordinary pack-ox of the Oukraïna breed.

But still more certain results appear to have been obtained by Mr. Iwanoff, of the veterinary laboratory of the Ministry of the Interior at St. Petersburg, in Mr. Falz-Fein's Park, by the hybridization of the *Bison americanus* with *Bison europaeus*. Both sexes of these hybrids are fertile and some further hybrids have already been obtained by crossing them with one of the parent species. These hybrids do not appear so far to have been obtained in any other place. The close consanguinity of the two species is certain, and the fertility of both sexes of their half-bred hybrids is only a further proof of this consanguinity. But the geographical distribution and the anatomical peculiarities of *B. americanus* and *B. europaeus* do not allow of their being considered as two varieties of the same species. The question is one therefore of a very rare case of half-bred hybrid mammals of which both sexes are equally fertile.

VAN ANDENAERD. **The English Leicester.** (Le mouton anglais Leicester). — *Journal des Sociétés Agricoles du Brabant et du Hainaut*, N. 7, p. 85. Bruxelles, Feb. 11, 1911. **1241**

Great Britain. New Zealand The English Leicester is one of the oldest and purest breeds of long-wooled sheep in the whole world. It is the point of departure for three other breeds; the Lincoln, the Border Leicester and the Romney Marsh. The Leicester is thick-set and well made. It is particularly suitable for crossing with the Merino breed. Its improvement has been directed towards the quality of the meat and the wool rather than form.

In New Zealand, the Leicester is a particular favourite for crossing with all breeds of sheep. From the point of view of wool. the latter variety does not produce such a heavy fleece as the Lincoln, but it has the same glossiness and general characteristics.

The Leicester breed occupies a special position as far as the colour of the face and ears is concerned; the original black colour sometimes recurs around the eyes and in the ear spots (1).

1242 DEVÉDEIX. **Training Farm for Elephants in the Belgian Congo. Their Utilisation in Agriculture.** (Ferme de dressage d'Eléphants au Congo Belge. Leur utilisation en Agriculture). — *Journal d'Agriculture pratique*, No. 12, p. 369, Paris. 23 Mars, 1911.

Belgian Congo There is a training farm for elephants in the Belgian Congo, containing about fifty of these animals, which are used for agricultural purposes. The training of elephants is likely to be of great service in Africa, where all other domestic animals are decimated by the Tsetse fly. By making use of the elephant, it has been possible to plough vast tracts of land which were hitherto unproductive, and which are now cultivated in cassava and rice, products which are invaluable in the country. It is impossible to set up a farm without domestic animals, and the elephant surpasses all others in strength, longevity and intelligence.

It is to be hoped that this species, which is tending to disappear in tropical Africa, may also be employed in the French Congo for agricultural purposes, as it already is in India.

1243 **Dairying in Switzerland.** (L'Industrie laitière en Suisse). — *Laiterie et Elevage (d'après le Recueil consulaire* 1911). Tome 152, livraison III, 6e année, No. 7, Louvain, Avril 1, 1911.

Switzerland Thanks to the importance of cattle-raising in Swiss agriculture, this country has suffered less than others from the rainy season of 1910.

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(1) For information on the Leicester breed and on the other British sheep, see ROBERT WALLACE, *British Breeds of Sheep*, published by the Board of Agriculture and Fisheries, in *Breeds of Live Stock*, London, 1910.

See also the publication of the Intelligence Office in the International Institute of Agriculture: *The Science and Practice of Farming during 1910 in Great Britain*, p. 479. *(Ed.)*.

Nearly three quarters of the agricultural land, properly so-called, is under forage crops; in the cantons of St. Gall and Appenzell the proportion is as much as 90 %. There are altogether 1 100 000 hectares (2.717.000 acres) of Alpine grazing land.

Since the development in the lowland country of the industry of products connected with cattle-raising, there is a tendency to fatten cattle in connection whith dairying, since the utilisation of mountain pasture land has been increased by the installation of aerial cables, by means of which the hay, enclosed in nets, is sent down into the valleys.

Whereas in 1829 Switzerland had no more than 750 000 head of cattle at grass, there are now 1 500 000. But on account of the deficient market for dairy produce the farmers are at present specialising in the raising of pedigree cattle.

It is calculated that a cow in Switzerland averages 2 650 litres (588 gals.) of milk per year. The milk production is thus 20 million hectolitres (444 million gals.) representing an average value of 333 million francs (£13 320 000). Of these 20 million hectolitres half is consumed as milk, 7 millions are used in the manufacture of cheese and butter and the remainder in preparing milk flour (*farine lactée*) and milk chocolate.

The following table gives the production of all the branches of Swiss dairying since 1897, in thousands of francs (1):

	Yearly Average Value		Annual Value 1907	Annual Value 1908
	1897-1901	1902-1906		
Fresh milk & cream	496	1 042	1 839	2 159
Fresh butter	231	68	92	48
Condensed milk	23 101	30 246	31 445	27 103
Cheese	41 101	44 406	54 183	54 128
Milk Sugar	35	3	13	1
Dried Milk Flour	2 529	2 464	2 784	2 536
Total	67 493	78 229	90 356	85 974

Butter is the only dairy-product which is not exported; on the contrary, it is imported, to the value of 10 million frs. (£400 000) yearly. There is however a big exportation of the other dairy products.

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(1) 25.25 frcs. = £1; 1000 frcs. = 40 £. (*Ed*).

Switzerland is obliged to get a part of her cattle for slaughter from abroad. During the last three years, she has imported the following cattle for this purpose:

	1907 head	1908 head	1909 head
Oxen	46 320	45 524	47 366
Pigs.	90 325	55 170	50 932
Sheep	115 420	115 682	118 140

Since 1886, the number of pigs in Switzerland has doubled, and is now a little more than half a million head, which is not nearly sufficient for the demand.

In 1906 there were 360 000 goats in Switzerland, representing a total value of about 10 million francs (£400 000) (1).

1244 CH. CLÉMENT. **Cost in Belgium and in Prussia of the Transport of Milk** (L'Amelioration du transport des produits lactés). — *Laiterie et Elevage,* 6e année, No. 8, pp. 57-60, Louvain, Avril 15, 1911.

Belgium. Germany: Prussia

This study on the improvement in the transport of dairy produce from the point of view of rapidity and price begins with a comparison between the Prussian and Belgian tariffs.

A consignment of 210 kg., (2) or 480 bottles of 125 gr. in pigeon-hole boxes, sent by goods train to a distance of 50 km., costs 3.40 fr. in Belgium, including the return of the boxes with the empty bottles, while the same in Prussia costs 1.50 fr. A consignment of 258 kg., or 128 bottles of 1 litre, sent under the same conditions and also including the return of the boxes, costs 3.60 fr. in Belgium, and 2.25 fr. in Prussia. The freightage is raised at the rate of 0.007 fr. per bottle of 125 grams in Belgium, and 0.004 fr. in Prussia; 0.03 fr. per litre bottle in Belgium and 0.019 fr. in Prussia.

It must be remembered that, like milk in cans, the milk in pigeon-hole boxes is sent by passenger train in Prussia, or by fast goods trains, which offers a great advantage for this kind of merchandise.

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(1) In 1906 (last census) there were in Switzerland 135 372 horses, 1 498 144 cattle, 209 997 sheep, 548 970 pigs, 362 117 goats *The Statesman's Yearbook for 1911,* p. 1260. (*Ed.*).

(2) 1 kg. = 2.2 lbs; 1 gram = 15.43 grains Troy; 1 km. = 0.621 mile; 1 fr. = 10 d. (*Ed.*).

An inquiry of the same kind in other countries, which the writer proposes to make, will be very useful; because the question of supplying the great centres with pure and wholesome milk at the general market price, is a very important one.

BORDAS and TOUPLAIN. **Organic and Inorganic Phosphorus in Milk.** (Phosphore organique et Phosphore minéral dans le lait). — *C.-R. de l'Acad. des Sciences*, T. 152, N. 13, pp. 899-900. Paris, 27 Mars, 1911. **1245**

The phosphoric acid contained in the ash of milk represents the whole phosphorus content inorganic and organic which it is interesting to differentiate and estimate separately exactly. **France**

Mr. Bordas has been studying since 1903 the variations in the lecithine contained in milk after creaming, pasteurisation, etc. The information which we possess as to the phosphoric constituents of albuminoids is very inexact.

By oxidising the organic matter by means of nitric acid and potassium permanganate, to estimate the organic phosphorus contained in the coagulum (butter-casein), figures are obtained which, added to those yielded by the determination of the phosphates in the lactoserum, give a total result equivalent to the amount of phosphates found in the ash of the entire milk.

We thus possess a simple means of estimating the quantity of phosphorus both in organic and in mineral compounds, completing the estimation of the total phosphorus by adding that contained in the lactoserum and in the coagulum.

E. FLEURENT and LUCIEN LEVI. **On the Estimation of Phosphorus in Milk.** (Sur le dosage du phosphore dans le lait). — *C. R. de l'Acad des Sciences*, Tome 152, N. 15, p. 1015, Paris, 10 Avril, 1911. **1246**

The writers, speaking of Messrs. Bordas and Touplain's preaceding note on the estimation of organic and mineral phosphorus in milk, point out that, if from their point of view, it may be admitted that the loss in phosphorus (0.065 gr. of P_2O_5 per litre) during the combustion of the organic matters in milk might be neglected (although it attains 3.90 % of the total phosphorus) the question **France** is not the same if this loss be considered in relation to the organic phosphorus, since this amounts to 21.30 % of the quantity determined by the above-mentioned investigators.

1247 A. FUNARO and L. MUSANTE. **Ewe's Milk in the Adulteration of Cows' Milk.** (Il latte di pecora nelle falsificazioni del latte di vacca). — *Atti dell'Accademia dei Georgofili* di Firenze, 1911.

Italy: Tuscany

This note deals with an adulteration which is practised generally at Leghorn, where large quantities of ewe's milk arriving daily from Pisa, Lucca and Grosseto, instead of being used in the manufacture of "pecorino" cheese, serve to make up the deficiency in fat of skimmed cows' milk. Thus detection of the sale of skimmed milk is rendered difficult. By this fraud watered or skimmed milk may be sold with a profit, amounting even to 2.50 fr. per 100 litres. It is therefore necessary to find a rapid means of discovering the adulteration (1).

Messrs. Fleurent and Levi confine themselves to the determination of the density of the serum; which, in pure milks even when they are very different from one another, varies within very narrow limits. Now this particular adulteration, although it brings the fat contents up to normal, disturbs the proportion of salts in the serum, decreasing its density. The determination of the density of the serum may easily be carried out in less than two hours.

Adding ewe's milk to cow's milk is of interest also from the hygienic point of view, because the digestibility and composition of ewe's milk is different from that of cow's milk.

1248 A. OLIVA. **Cost of Working Parmesan Cheese or „*Grana Cheese*", by Steam.** (La lavorazione del Grana a vapore). — *L'Avvenire agricolo*, anno XIX, N. 3, pp. 106-111, Parma, 31 Marzo, 1911.

Italy

The standard manufacture of the Grana Parmesan cheese of Reggio and Lodi has been carried out up to the present by heating the milk directly on a wood fire.

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(1) The mixture of milks of different animals constitutes true frauds, as for the production of certain cheeses; thus ewe's milk, which ought to be used alone in the manufacture of Roquefort cheese, is sometimes mixed with goats' or cows' milk.

See VILLIERS, COLLIN and FAVOLLE *Aliments lactés et aliments gras.* — Paris, 1911. *(Ed.)*.

But in consequence of the high price of wood and the improvements which have been made in the machines for steam heating, the latter system has now been introduced into the many cheese dairies of Parma, Reggio and Modena.

Mr. Oliva estimates the installation cost (for 2 boilers and a 4 HP motor) at 5575 fr. (£223) and the cost of transforming the direct heating machines into steam heaters at about 4000 fr. (£160).

The annual expenditure for steam manufacture is as follows:

Interest on installation capital	250 fr.	(£10)
Depreciation (calculated for twelve years)	400 »	(£16)
Fuel (100 qs. at 4.50 per q.)	450 »	(£18)
Repairs and lubricants	100 »	(£ 4)
Total expenditure .	1200 fr.	(£48)

The expenditure for the manufacture over wood fires is as follows:

Hiring of two boilers	100 fr.	(£ 4)
Wood, about 500 qs.	1300 »	(£52)
Total expenditure .	1400 fr.	(£56)

The difference in cost between the two methods is slight; but the steam installation can also be used for churning, giving a larger yield of butter of more even grain than hand labour. From 3 to 4 % of butter can also be obtained from the whey; in a cheese factory which works 3500 quintals of milk yearly, this gives about 12 quintals of butter in the year. With butter at 250 fr. (£10) the quintal, there is thus a surplus yield of 3000 fr. (£120) per year.

In order that the steam manufacture of the Grana may be economical two, or better, three forms should be worked simultaneously every day.

G. FASCETTI. **Study of "Bitto" Cheese of Lombardy.** (Studi sul formaggio "Bitto"). — *Rivista scientifica del latte*, anno I, p. 1-12, Reggio Emilia, Marzo, 1911. **1249**

Italy: Lombardy

"Bitto" cheese takes its name from the valley of the Bitto, a tributary of the Adda. It is made in two types: the fat type which is similar to the Battelmatt (1), and the Sbrinz type (2), which is made with partially creamed milk.

The annual production of this cheese, which is manufactured in the hills, is about 3000 quintals, half of which is of the Sbrinz type, and it is all brought to the market of Brinzi, where traders from Bergamo and Como go to make their purchases.

The cheeses which are freshest and have some holes are consumed immediately, while the others are allowed to ripen for a year or two.

The travelling lecturer and the agricultural cooperative associations of Sondrio and Morbegno have started cooperative stores, thus creating an important market for the cheese.

The original "Bitto" cheese is made of whole cow's milk, with about a fifth of goats' milk added to it. The weight of each cheese varies between 15 and 30 kg.. the average being 20 kg.; the cheeses from 30 to 50 cm. in diameter, and the colour of the paste is something like that of Emmenthal.

The paste inside is smooth and brilliant and contains small holes of a diameter of from 2 to 3 mm., which are very regularly distributed. The cheese when two years old is harder and has a stronger flavour, and the holes are filled with a dense liquid which has a pleasant taste.

A hectolitre of milk gives 12 kg. of fat or 9 kg. of semi-fat cheese, and 3 kg. of butter. "Ricotta" is made from the whey.

The analysis of four samples of "Bitto" cheese has given the following average percentages:

Water	31.78
Fatty matters	33.59
Casein	28.81
Ash	4.83

A peculiarity of the manufacture of "Bitto" cheese is that the milk is heated up to 40° C. for coagulation. The following are other technological data of this manufacture:

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(1) « Battelmatt » a fat, soft cheese, with holes like Gruyère, is made in Switzerland and in the Vorarlberg: each cheese weighs from 20 to 25 kg. (1 kg. = 2.2 lbs) and the usual dimensions are, height from 8 to 10 cm., diameter 50 to 60 cm. (1 cm. = 0.39 inch). Cf. BESANA, *Caseificio*, Torino, 1908. (*Ed.*).

(2) « Sbrinz », which is better known under the name of Spalen cheese, is made in Switzerland in the Cantons of Unterwald, Uri, Lucerne, Zug, etc. It is a semi-fat cheese weighing from 10 to 30 kg., of similar dimensions to Gruyère, and similar to it also in technique. Cf. *op. cit.* (*Ed.*).

Coagulation temperature, 41° C.
Liquid rennet % cc. 11.
Breaking up of the curd and duration of coagulation, 30 min.
Duration of cooking. 31 minutes.
Cooking temperature, 44° C.
Duration of stirring (*Spinatura*) away from the fire, 7 minutes.
Resting of cheese in boiler, 18 minutes.
Pressure, 2 kg. per kilogram of cheese.
Yield, 11.70 %
Loss in weight after two months, 14.60 %.

Roquefort Cheese Produced in Corsica. (Formaggio di Roquefort prodotto in Corsica). — *Bollettino del Ministero di Agric., Ind. e Comm.*, Series E., Fasc. 2, p. 96, Roma, Jan. 16, 1911. **1250**

France: Corsica

Some French manufacturers of Roquefort cheese set up dairy farms in Corsica six years ago, where they have been making Roquefort cheese with success.

The milk used in this manufacture should not be sour; it should scale 17° by the lactometer, and the temperature of the premises should be 20° C. The milk is steam heated to 30°; the liquid rennet is added, the whole stirred, and the whey strained off.

The curds are then cut into pieces, weighing half a kilogram (1.1 lb.) and put into iron moulds after being covered with a blue powder, prepared from mouldy unleavened rye bread. The cheese should be allowed to drain for 5 days, after which it is put into a cold cellar; it is salted only once. It is pierced in several places with an iron wire, in order to aerate and let the water run out.

The satisfactory results obtained in Corsica, show that Roquefort cheese could be produced in Sardinia and in the Roman Campagna. The secret of the manufacture has nothing to do with the caverns of Roquefort (in which the original cheese is prepared), but is simply due to the cold storage and the use of rye-bread mould, which can be prepared everywhere.

The Use of Cold Storage Meat in the French Army. (L'emploi de la viande frigorifiée dans l'armée en France). — *Revue général du froid*, No. 23. pp. 188-198, Paris, Avril, 1911. **1251**

France

There was an interesting discussion in the French Chamber of Deputies on March 14th, 1911, on the use of cold storage meat in the French army and the organisation of the necessary services.

Frozen and cold-stored meat should be given to the soldiers even in times of peace, in order that the persons who have to a tend to the work of preserving the meat may learn how to preserve all its qualities.

The discussion is published *in extenso* in *Revue gen. du Froid.*

1252 **The Petaluma Poultry Industry in California** — *The Illustrated Poultry Record.* Vol. III, No. 7. p. 312. London, April. 1911.

United States: California

Petaluma, in Sonoma County, California, is one of the greatest egg centres of the world. The city, of 7 000 inhabitants, is situated about 40 miles (64 kms.) north of San Francisco, and is about 20 or 30 miles inland. It is connected with San Francisco by water and rail and its transportation facilities have been an important factor in the development of the industry.

Petaluma, Santa Rosa, Healdsburg, Cloverdale and other smaller towns in Sonoma County supply San Francisco with about half its annual supply of eggs. Petaluma alone sent out, in 1910, 7 159 481 dozen eggs and 120 018 dozen fowls.

The following figures give the exports from Petaluma from 1903 to 1909. To obtain the total production, to these figures should be added the number of eggs used for hatching and the eggs and other poultry produce used for home consumption:

Year	Eggs Doz.	Poultry Doz.
1903	3 407 333	32 535
1904	3 493 321	32 286
1905	3 837 061	39 392
1906	4 334 321	39 938
1907	4 422 968	39 392
1908	5 312 804	83 136
1909	7 159 481	120 018

Recent organisation among the producers and a system adopted for grading eggs has given encouragement to more careful methods. A Cooperative Egg Exchange has been established. The producers deliver their eggs to the Exchange, where they are graded. But only a portion of the produce of Petaluma is handled through the Exchange. The average price for all eggs, in 1909, was 27 3/4 cents (or 1s 1 1/4d) per dozen.

The Transylvanian Naked Neck Fowl. — *The Illustrated Poultry Record*, Vol. III, No. 7, pp. 302-303. London, April, 1911. 1253

Austria Hungary. Servia Bulgaria Russia

There are in South Eastern Europe two breeds of poultry with very distinctive peculiarities. These are the so-called Danubian Goose, with its long, abundant posterior feathers and the Transylvanian Naked Neck Fowl. The last breed is to be met with in Austria, Hungary, Servia, Bulgaria, Roumania and Bessarabia. It is further stated that there are Naked Neck fowls in Madagascar.

Probably the breed originated in Central Asia and thence passed into Europe and by Persia or India to Madagascar.

The appearance of the birds is very peculiar. In size they are medium (4 to 6 lbs, or 2 to 3 kgs), with longish neck and legs, giving a somewhat stilty look, as the thighs are small. The body is round and well developed, flat and muscular in front, with large, strong wings. The cock's tail is full and carried almost horizontally. The head is neat, and the comb single. The head and neck for four or more inches (ten or more centimetres) downwards are naked except for a full, clear-cut band of soft feathers a little above the shoulders; the head and flesh thus left uncovered are bright red. As a rule, the best specimens are pure white in plumage; a few coloured Naked-Necks are seen, mainly reddish brown.

The peasants of the countries named prefer this breed to all others; the Naked Neck Fouls are so hardy and vigorous. They are very and active during the greater part of the year find all their own food.

Silk Production in Bengal. (La Sériculture au Bengale).— *Bulletin des Soies et des Soieries*, N. 1772. pp. 5-6. Paris-Lyon, 22 Avril, 1911. 1254

British India: Bengal

The exportation of silk from Bengal showed the following figures during the last four years:

1907	288 544 kg.	= 5 680 cwt.
1908	255 882 »	= 5 228 »
1909	204 579 »	= 4 224 »
1910	398 678 »	= 7 848 »

The marked increase in 1910 is due to the efforts made by the Agricultural Department of Bengal for the promotion of silk-worm rearing.

The Committee appointed consists of the Director of Agriculture, the Collector of Murshidabad and four persons from the first silk houses in the country.

There are now 18 silk production stations in Bengal. The experiments carried out have demonstrated that it is possible to avoid the silkworm disease known under the name of « pébrine », which has largely contributed to the depression of the silkworm industry in Bengal.

The total product of the sale of silkworm eggs in 1909-1910 has risen to 6 566 rupees, or 692 rupees more than in the previons season.

The experiments which have been carried out at Berhampore with some Italian mulberry trees, as well as those at Calcutta for the preservation of silkworm eggs and cocoons by cold storage, have been very successful.

A school has been opened for the children of the silkworm breeders employed at the Berhampore silk-culture station.

1255 D. E. Lantz. **Raising Deer and other Large Game Animals in the United States.** — *U. S. Dept. of Agric.-Biological Survey Bull.* No. 36, pp. 7-39. Washington, Dec. 31, 1911.

United States

The raising of indigenous or imported mammals, which are allowed to live in a wild state, is opening a new field for breeding experiment in the United States, while it also offers an advantageous investment for capital.

The preservation of species which are disappearing, as *Hippotragus leucophoeus*, their use, the skin industry and the game trade make the solution of this problem of interest. *Cervus canadensis* (Rocky Mountain Elk) and *Odocoileus virginianus* (Virginia Deer) may, as shown by the first experiments, be raised successfully as well as cheaply in all climates and in the most different places.

About seven years ago, the Otzinachson Rod-and-Gun Club introduced 90 deer into a park of 1000 acres and today the herd comprises 2000 head.

There are more than 250 000 000 acres of land in the United States which are not suitable for cultivation and cannot be used as pasturage for horses, cattle or sheep. This vast region, which is completely unproductive for the moment, might be profitably utilized for the production of game.

1256 Kuhnert. **Fertilisers for Fish Ponds.** (Teichdüngungsversuche). — *Mitteilungen der Deutschen Landwirtschafts-Gesellschaf* XXVI J., S. 14, pp. 173-175, Berlin. April 1, 1911.

Germany

Mr. Kuhnert recommends the use of fertilisers for fish ponds. Comparative experiments should be the following:

Pond No. 1: not treated.

Pond No. 2: 5 to 6 kg. of basic slag or superphosphates, 2 to 3 kg. of potassic salts at 40 % or 6 to 8 kg. of Kainit per *are*.

Pond No. 3: as No. 2, and in addition, 2 to 4 kg. of nitrate of soda per *are*.

The basic slag and the potassic salts may be spread over the bottom of the pond, or thrown in to the water during the winter; the superphosphates should always be applied before the water is put into the pond, while the nitrate of soda should be divided into 3 or 4 parts and put into the water during the first warm days of spring, from the end of April to the middle of May.

The experiments made by the writer in 1910, continuating others of previous years, with carp and tench, have confirmed the great utility of phosphatic and potassic fertilisers which increase the produce by more than a third. It is therefore obvious that the Chili nitrate fertiliser would increase the production still more, so that, after deducting the cost of the nitrate, there would be a net profit of from 24 to 84 frcs per hectare from the additional fish.

Mr. Kuhnert also recommends that experiments be made with calcium and stable mauures.

P. PYRLAS. **The Resinous Wines of Greece.** (Les vins résinés de Grèce). *Progrès Agricole et Viticole*, N. 11, pp. 321-326, Montpellier, 12 Mars, 1911. **1257**

Greece

Two kinds of wine are manufactured in Greece for common consumption; the ordinary wines, part of which are exported, and the *resinous* wines, entirely for home consumption. The latter are made by the fermentation of the must, to which pine tree resin has been added. A very long time ago, the Greeks discovered that the addition of resin to the must acts as a preventive to various diseases, and resinous wines are still preferred by them.

The principal stocks used to make the resinous white wines at Athens are: the *Savatianno* and the *Rhoditis*. Immediately after the vintage, the grapes are pressed and the must is sent to the cellar of the wine merchant, who adds resin in the proportion of 4 to 5 kg. per hectolitre or more. The resin is first worked up with a small quantity of must to ensure its better distribution. During fermentation the resin floats on the surface, but when the carbonic acid stops coming off, the density of the liquid having lessened, the greater part of the resin is precipitated to the bottom. A sort of slow separation then takes place, the oily part of the resin floating to the surface and forming a protective layer which prevents the passage of the air. This oil of turpentine becomes resinised under the action of the oxygen of the air, and in this state is precipitated to the bottom of the cask; but it is continually renewed at the top. A very small quantity of turpentine is dissolved in the wine, which acquires a strongly resinous taste. Before being put on sale, the wine is kept until all the resin is precipitated.

The wine is not racked, and is left on the lees until it is put on sale; the merchants are of opinion that racking destroys the freshness of the wine and prevents it from keeping so well. In spring, the wines often become sour (*tourne*); ropy (viscid) (*graisse*) or suffer from pushing (*pousse*) (Germ. *das Treiben*). If they are protected from the air when racked, all these diseases may be prevented. Resinous wines become affected with damp-spot (*piqûre*, Germ. *Moderflecken*) when the protective layer of oil is insufficient, and the mannite disease (*la casse*) is also produced at times; the latter should be treated with citric acid.

Resinous wine should be very dry and contain from 12° to 13° of alcohol. The acidity expressed in sulphuric acid per litre should oscillate between 4 and 4.50 gr. These wines are deficient in tannin. The consumer requires the following qualities: 1) perfect clearness; 2) colour clear amber yellow; 3) *very pronounced* taste of resin; 4) freshness and even a slight carbonic taste; 4) neither too insipid, nor too acid, nor too alcoholic (13° at the maximum).

These wines cannot be left to get old; they become bitter, and turn red in colour on account of the incessant oxidation of the turpentine. Amongst the principal resinous wines of Greece are the following: those of Athens, Salamina, Ægina, Megara, the Island of Euboea, Patras, Nauplia and Tripolitza. The resinous wines promote digestion, and are diuretic and stimulating; they should be highly esteemed amongst table wines.

1258 **Sugar and Alcohol Regulations for Madeira Wines.** (O Regimen de Assucar e do Alcool na Ilha da Madeira) — *A Vinha Portugueza,* N. 3, p. 93. Lisboa Março, 1911.

Portugal
Madeira

A Decree has been issued by the Portuguese Government with regard to sugar and alcohol in Madeira.

Foreign molasses may now be imported into the island when the local production of sugar cane is not sufficient for the needs of the Madeira wine manufacturers.

At the same time the cultivation of the cane is restricted to the best soils and the danger of the continuons cultivation of one crop thus avoided.

The Decree also sets aside a certain capital for the protection, development and improvement of the Madeira wine industry.

O. PRANDI AND E. CIVETTA. **Manganese in Wine.** (Il manganese nel vino). — *Le Stazioni Sperimentali Agrarie Italiane.* Vol. XLIV, E. I.? pp. 58-65, Modena, 1911. **1259**

Italy: Piedmont

The analysis of 24 samples of Piedmontese wines of different quality has given a minimum of 0.53 gr. of manganese per litre, and a maximum of 1.65: average 0.82. Generally speaking, the finest wines. those which have the most delicate bouquet when they are old, such as the *Nebbioli*, and especially the *Barolo*, and *Barbaresco*, are the richest in manganese. A *Nebbiolo* of 1883 was an exception to this rule; it had completely lost its colouring matter, and had an abundant sediment.

L. MOREAU and E. VINET. **Method of Eliminating Arsenate of Lead from the Vintage.** (Comment s'elimine l'arséniate de plomb apporté par le vendange). — *C. R. de l'Acad. des Sciences*, T. 152, N. 16, pp. 1057-1060. Paris, 8 April 1911. **1260**

France

As only a small quantity of arsenate of lead is introduced by gathering grapes from vines which have been treated before flowering and as nearly all of this is eliminated during the pressing and wine-making operations, very slight traces, at the most. should be found in these wines as a rule. In practice, these traces, when they exist, are more often than not similar to those found in wines made from vines which have never received arsenical treatment. Under these conditions, it would seem that the wine made from vines which have been treated before flowering may be consumed without danger.

It might be quite another matter if the vines were treated late after the flowering.

The elimination of arsenate of lead should be carried out especially during the pressing, because this substance would otherwise be retained in the residuum, since it is found exclusively on the stalks, to which it adheres more readily than to the fruit.

1261 A. MERTENS. **The Preservation of Hops when Removed from Cold Storage.** (La conservation du Houblon après sa sortie du frigorifère). — *La Bière et les boissons fermentées.* 20e année, N. 3, pp. 26-28. Paris, March, 1911.

Belgium Hops are now stored in bundles weighing 150 kg., but the present monthly consumption in the French high fermentation (1) breweries is little more than 100 kg.; and it is also customary to use several kinds simultaneously. The result is, that after the hops come out of cold storage they are sometimes left exposed in the barns of the brewery for a very long time.

Mr. Mertens, of Louvain, wishing to discover in what way they might be preserved, took several specimens which had been kept in cold storage in different places and for periods varying from 10 to 22 months. The antiseptic power of the different hops was very variable, but the curve graphically representing the antiseptic power of the duration of preservation after they came out of the cold store, was constant under the trial conditions. The antiseptic power may fall to 30 % of its initial strength in less than a month.

The brewer should use hops which have been cold stored, as soon as possible after they come out of storage; he should keep them under the best conditions, that is to say, in a cool, dry place and preferably in the dark.

Hops which are to be used in average or small high-fermentation breweries, should be made up in packages weighing 50 kg. at most, and the consignments to the brewery should be made in proportion to the needs.

1262 E. KAISER. **Researches on the Juice of Beer Yeast** (Recherches sur le suc de la levure de bière) *C. R. de l'Académie des Sciences,* T. 152, N. 14, pp. 975-977, Paris, 3 Avril 1911.

France Whilst studying Mr. Lebedeff's convenient methods (2) for procuring the active juice of yeast, Mr. Kaiser found that the state of the yeast, the method of drying, the proportion of water added to it, and especially the temperature at which the maceration is carried out are of great importance. Repeated microscopical observation has shown how this juice may easily be preserved at the ordinary temperature even without the addition of antiseptics.

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(1) The fermentation of beerwort is performed by two different methods, namely, " high " and " low " fermentation. High fermentation wort is made at a relatively high temperature, which varies from 12° C. to 20° C. Low fermentation, on the contrary, generally takes place at a temperature of from 6° to 7°. In the first case, the fermentation is finished in from two to five days, while in the second it lasts from 8 to 15 days.

See E. Boullanger, *Industries agricoles de fermentation,* Paris, 1903.

(2) These consisted of extracting the zymase by maceration. See No. 398 of the Bulletin of February 1911. (*Ed*).

The study made of the influence of the temperature, the nature of the sugar and the concentration of the juice, shows that the substance obtained by Lebedeff is very similar to Buchner's zymase.

The Dried Yeast Industry. (Die Hefe-Station der Brauerei. Anregungen für die Brauereimaschinen-Austellung auf der Oktobertagung 1911). — *Tageszeitung für Brauerei*, IX J., N. 83, pp. 415-416, Berlin, April 1911. **1263**

Germany

The investigations made by the Experimental Institute and School of Brewery at Berlin into the utilisation of the surplus yeast produced by the breweries have been brought to a conclusion. The results may be summed up as follows:

1) The technical basis of the desiccation of yeast is now established; the German mechanical industry is in a position to supply the breweries with good, remunerative desiccating apparatus, of various constructions.

2) Desiccated yeast which is not deprived of its bitterness (fodder yeast) is affirmed to be a food of the first quality for fattening numerous species of animals.

3) Desiccated yeast deprived of its bitterness (alimentary yeast) has been recommended as a suitable, savoury and very digestible food for man.

4) The necessary expenditure for taking away the bitterness is very small, and there is an average yield of 80 and even 90 %.

5) Beer yeast may be usefully employed in the preparation of the simple products of the biscuit factory.

An outlet being assured for fodder, alimentary and baker's yeast, it is to the interest of the brewers to collect the whole of the yeast that they produce.

For the completion of its studies on this subject, the Experimental Brewery Institute has decided to instal a special Section at the Brewery Machine Exhibition which is to be held in October of this year, on the occasion of the Berlin Congress. This Section which will be called the Brewers' Yeast Station, will exhibit all the devices and apparatus for the improvement of the production and utilisation of yeast.

The following is the plan of the exhibits:

I. EXTRACTION OF THE YEAST FROM THE FERMENTATION VATS.

1) Dredges for collecting and taking away the yeast from the fermentation vats.

2) Pumps for transporting the yeast from the fermentation to the washing receptacles.

II. WASHING OF THE YEAST.

1) Sieves for separating the impurities and membranous clots; agitators and rinsers; applications of motors.

2) Apparatus for washing, and depositing and for removing the bitterness.

III. YEAST REFRIGERATORS.

Vats and barrels for preserving the yeast, ice and salt-mixture refrigerators.

IV. EXTRACTION OF THE YEAST FROM THE WASHING WATERS.

1) Centrifugal separators for the complete separation of the yeast from the washing water.

2) Yeast presses;

a) hand; *b*) hydraulic; *c*) steam. Sacks, press cloths, etc.

V. MACHINES FOR CUTTING UP THE YEAST AND FORMING THE COMPRESSED YEAST INTO PIECES OF A FIXED WEIGHT AS BAKERS' YEAST.

VI. DRYING INSTALLATIONS.

1) Apparatus for transporting the moist or compressed yeast to the drying chambers, such as pumps, bands and spirals.

2) Drying chambers.

a) steam, drums or flat, with direct steam or evaporation, with and without vacuum; *b*) air; α) drying by direct fire with a device for heating the air; β) by injector with a device for the spraying of the fresh yeast by the injection of air and drying of the "yeast mist" by hot air.

VII. COLLECTION, TRANSPORT AND STORAGE OF THE DRIED YEAST.

1) Ventilators for the yeast drying chambers for the collection of the yeast dust,

2) Apparatus for transporting the yeast to the warehouse. Elevators, bands, spirals, pneumatics.

3) Warehouses, pits for preserving the dried yeast.

A part of this material serves, not only for the treatment of the surplus yeast produced, but also for the production of the yeast itself which makes it indispensable to have culture barrels, barrels for the production of the yeast, and mixture and aeration apparatus.

The exhibition will be of great importance to the beer industry, and supplies a real need.

Sugar Production in Spain. (Produción de azucares) *España Economica y Financiera*, Madrid, Enero 28, 1911. **1264**

Spain

According to the information published by the General Direction of the Spanish Customs the sugar factories of Spain have done good business in the half year July 1st to Dec. 31, 1910.

The following are the figures of the raw material used by the factories and their output of sugar during the working years 1909 and 1910:

	1909	1910
Raw material	Kg. 545 536 200	Kg. 419 883 087
Sugar product	» 58 463 582	» 44 285 178

This statement shows that in 1910 there was a decrease of 125 653 113 kg. in raw material and of 14 178 404 kg. in sugar on the preceding year.

LAURENT. **The Present State of the Starch Industry.** (L'état actuel de la féculerie industrielle) *Revue générale de Chimie pure et appliquée*, Tome, XIV, N. 6. pp. 105-116. **1265**

France

Although the French starch production in the Department of the Oise alone reaches nearly 5 million kg. yearly, there were only some simple didactic treatises and not a single modern monograph on the starch industry in the French language, constituting an original critical work. This industry, which is in the hands of small cultivators, half farmers and half industrials, is one of the most backward in the country.

This brief monograph is written with the object of describing the starch industry as it should be. By a comparative examination of the different crops, the methods of extraction and purification of the starch and the working of the by-products, it leads to the conclusion that French starch-making might be improved to the point of being able to compete with the products obtained elsewhere; this would require better cultivation of potatoes and the creation of well equipped central works with a properly qualified staff. The article is illustrated by numerous figures.

1266 **Preserved Olives, and the Countries where they are prepared.** (Les conserves d'Olives et leur pays de production). *Bulletin de la Direction de l'Agriculture, etc. Régence de Tunis,* N. 57, pp. 492-505, 4e trimestre, 1910.

Mediterranean Countries. California

Up to a very few years ago, the preserving of green and black olives was an industry confined to European Countries bordering on the Mediterranean.

At the present day, Africa and America have begun to produce this article, and the olives which they send to the market have a great reputation.

France. The Departments of the South of France produce a very large number of varieties for preserving both in the green and black stage. The following are preferred: *Verdale, Lucques, Picholine* and *Amellaou.*

The French production fluctuates from year to year; it reaches about 600 000 kg., without counting home consumption.

Algeria. The green olives are sliced with reeds, and preserved in brine or vinegar spiced in various ways.

The black olives are salted and consumed during 6 or 8 months of the year.

Kabylia, where the first factories for olive preserving were set up, is now rivalled by the Department of Oran where the proprietors of the olive groves are mostly European.

The average production of olives in Algeria is about 2 000 000 kg. The most remarkable varieties are: *Bounchok, Zéradj, Aberkan, Téfah, Hamma* and *Bréa.*

Tunis. It seems likely that there will be a certain number of factories for preserving olives in Tunis when the transport service is better. The varieties to be recommended here are: *Barouni, Besbassi, Zarazi Ressassi, Marsaline,* etc.

Greece. Greece does a considerable trade in preserved olives, for which the Prefectures of Magnesia and Phocis (Pelion and Parnassus in Doris)are especially famous. The preserved black olives of Thessaly are called Pelion olives.

The olives of Kalamata are celebrated.

The cultivation of olive trees with large fruit is made for the most part on the Pelion group which overlooks the town of Volo. In 1907 the export amounted to 5 533 827 kg., and more than half the olives exported are bought by America, Egypt and Turkey.

Turkey. Preserved olives are largely used in the food of the Turks, especially amongst the country people and soldiers.

European and Asiatic Turkey produce an average of 100 000 tons of preserved olives and in Brussa alone the production is 60 % of this total.

This industry is mainly in the villages on the shores of the Sea of Marmora, the islands of the Egean sea and Tripolitania. The most valued varieties are called: *Tchelebi, Zeituni de Sélé and Zeituni de Trigli.*

About a quarter of the production is exported, that is, about 25 000 tons, to Russia, Bulgaria, Roumania and Servia.

Spain. Spain has a world-wide reputation for her preserved green olives, and those of Seville, the *de la Reine* the *Zorzatenas*, etc., are particularly esteemed. Andalousia furnishes the largest supply and the trade is concentrated in Seville. The total production is 175 000 quintals.

Portugal. Portugal exports mostly bottled olives for the Anglo-Saxon countries and for Brazil. The *Cordovil* and the *Judiaga*, which weighs as much as 14 gr., are the most celebrated.

Italy. Italy holds a certain rank in the production of preserved olives, although her exportation is limited to the *Lucca* and *St. Francis* varieties, from the district of Ascoli. In the Southern provinces, the following olives are cultivated; *Crossa, Concia, Andria, Santo Agostino, Passola, Arcolana, Rotondella* and *di Spagna*. The *Nocillara* is renowned in Sicily.

In good years the Italian production of preserved olives is estimated at 35 000 quintals.

California. During the past twenty years the preserved olive industry has made considerable progress in California. The varieties prepared are known under the names of *Mission* and *Manzanilla*.

The production in 1906 was already about 1 000 000 bottles of 1 litre. The county of San Diego is likely, by its situation, to become a very important centre for the industry, as well as the county of San Joachim, where there are already three important factories.

1267 **The Preservation of Olive Pomace in Tunis.** (La conservation des Grignons d'Olives en Tunis). — *Buletin de la Direction de l'Agriculture, etc., Régence de Tunis*, N. 57, pp, 476-487, 4^e trimestre, 1910.

Tunis

Olive pomace, kept in heaps in the open air, becomes considerably altered; the oil taken from it turns very acid, and there is also a very considerable loss of fatty matters.

The method of preservation which has given the best results is that of keeping this residue submerged in a weak solution of sulphate of copper.

The method of dry preservation most recommended is in ensilage, with tight packing, and then the removal by vertical cutting. The object to be attained is to keep the substance moist, and entirely protected from air and sun.

If the pomace becomes dry, it should be watered when it is piled in heaps. The preservation would be greatly furthered by the injection of carbon disulphide into the interior of the mass after the silos have been made.

The lining of the silo requires some time, and the watering of the layers of skins, little by little as they are stacked up, with a 1 or 2 % solution of formic aldehyde, would certainly help the preservation, while the better quality of the resulting product would, to a great extent, compensate for the additional expense. The residue ought always to be inspected before use, because if it has become mouldy, it may be a serious danger to the cattle.

1268 **A New Transatlantic Steamer with Cold Storage Plant.** (Un nouveau transatlantique à installations frigorifiques). — *La Revue Générale du Froid*, 3^e année, tome III, N. 4. pp. 174-177, Paris, April 1911.

France

On March 19th last the Messageries Maritimes Company launched a new large packet boat, the "Paul Lecat". This ship is of interest on account of its cold storage installations, the main object of which is the preservation by cold of all the commodities consumed on board; but an auxiliary storeroom is reserved for the transport of merchandise.

The total space set apart for cold storage is more than 300 cub. metres and is subdivided as follows:

3 chambers for meat, a thawing chamber and a butchery;

2 chambers for vegetables;

1 chamber for fish and game, with two large cupboards annexed for thawing;

1 chamber for butter and cheese;
1 chamber for fruit;
1 ice-house with the apparatus for ice making, giving 300 kg. of transparent ice daily;
1 cellar for wine where the temperature is from 10 to 12° C.

The arrangement of the cold storage chambers is described on a plan inserted in the text of the article. They are all abaft the engine bulkhead on the third deck. The meat chambers are kept cold by means of circulation of cold air and radiation from pipes of brine placed inside the chambers. The others are kept cold by the circulation of brine.

The two carbonic acid compressors have each a power of about 40,000 frigories for a sea water temperature of 30° C.. and a brine temperature of —15° C,

The Use of Cold Stored Meat in the French Army. — See No 1251 of this Bulletin. **1269** **France**

Agricultural Engineering and Farm Machinery and Implements.

C. A. Olcock. **Sanitary Cow Stalls and their Construction.** *The Maritime Farmer, Sussex, New Brunswick, Canada.* Vol. 16, No. 12, March 21, 1911, pp. 375-377. **1270**

Canada: New Brunswick

With the aid of numerous photo engravings and line drawings, the writer describes four different styles of unpatented stalls for cows that have been found satisfactory when put into practical operation during the past few years.

The features aimed at in these stalls are comfort of the animals, sanitation and cleanliness in regard to milk supply. Bills of material, with cost of construction for these several stalls are given.

1271 B. Coventry. **The Bamboo Wattle Silo.** *The Agric. Jour. of India.* Vol. VI. Part. 1, pp. 20-27. Calcutta, Jan. 1911.

India Round silos having been found successful in America, and the demand for silage increasing in Pusa (India), it seemed well to devise a silo having the proper shape and dimensions, but constructed with inexpensive materials, which would provide the Agricultural and Military Departments with a cheap means of storing fodder, and would also meet the requirements of cultivators.

The silo was made of bamboo wattle covered over with a plastering of mud, it had a light roof of thatch; the size was 24 ft. by 18 ft. diameter, and the gross capacity 6 096 cubic ft. Windows were let into the wattle at intervals of 6 ft., and the top window was cut in the roof and provided with a weather-roof. A brick foundation is necessary to prevent rotting at the base.

The cost of construction is small, but varies with circumstances from Rs 50 to Rs 200 (£ 3.7s. to £ 13.6s,).

The material is placed in the silo either by coolies, or by means of an elevator.

The best crops for siloing are maize and sorghum.

1272 **The Zehetmayr Cylinder Harrow.** (Die Zehetmayrsche Walzenegge) *Deutsche landw. Presse*, N. 21. s. 246. Berlin, 15 März 1911.

Germany In Germany and Austria, the Zehetmayr cylinder harrow has given very good results. This harrow serves not only for cultivation in rows, for which it was especially constructed, but also for ordinary crops. Its strength and simplicity allow of its being used by any of the peasants. It may be used for harrowing wheat in spring.

It is composed of three rectangular steel or iron frames, arranged in a triangle, one in front of the others. Several toothed cylinders turn in each frame, and, rolling over the soil, harrow, level and press it. An ordinary harrow may be fixed on behind if necessary.

1273 Gaspari. **The Milking Machine in Belgium.** (La machine à traire en Belgique). — *Journal des Sociétés Agricoles du Brabant et du Hainaut*, N. 4, pp. 42-43. Bruxelles, 21 Janvier, 1911.

Belgium The use of the first milking machine marks a new era for milk production in Belgium. It is of the Wallace type, and has been bought by a farmer at Kain-les-Tournai. The cows do not mind the machine, and are perfectly quiet during milking; this takes about the same time as milking by hand, while the execution is greatly superior. The milk is absolutely clean, the cow is not inconvenienced, and the teat cannot be injured.

The introduction of this machine makes possible the production of an absolutely pure milk. It may be predicted that the cost of the machine-milked product will not be greater than of that milked by hand.

1274

The Alfa Dalen Milking Machine. (La machine à traire Alfa-Dalen). — *Journal des Sociétés du Brabant et du Hainaut*, N. 11, p. 141. Bruxelles, March 11, 1911.

Belgium

In the course of the past year, the Alfa-Dalen milking machine was used in some interesting experiments at the Zootechnical Institute of the University of Louvain.

The authors of the experiments came to the following conclusions:

The Alfa-Dalen milking machine marks a great progress in machine milking. Experimentally it is satisfactory. It presents great advantages, epecially the obtaining of a much purer milk than is possible by hand, and the milking is equal, no matter how many cows are treated; it also saves a great deal of labour.

1275

The Testing of Separators. (La verification des Ecrémeuses). — *La Laiterie Belge*, Série 1911, N. 1, pp. 1-7.

Belgium

In choosing a separator attention should be paid principally to the perfection of the separating, all other considerations being left until it is a question of choosing between several machines which have the same separating capacity.

When comparing two separators one of which leaves 0.1 % of fat while the other leaves 0.25 %, it will be found that there will be an annual loss of 5589 fr. in a dairy treating 3000 litres (660 gals), of milk daily.

It is not sufficient, either, to test the machine at the time it is bought; periodical tests should be made to make sure that it is continuing to do good work.

The best way of ascertaing this is to measure the fat left by the apparatus in the skimmed milk. This estimation should be made by dissolving out the fat; the cost of an analysis by a good chemist is worth while, as by this means the separator can be adjusted to do its most profitable work.

The defect in the separating once verified, care must be taken to make sure that it is not due to causes outside the apparatus, such as: resistance of the milk to separating, too high temperature, insufficient number of revolutions, irregularity of movement, too rapid delivery, etc.

1276 **New Receptable for Wine and Similar Liquids.** (Behälter für Wein und ähnliche Flüssigkeiten). — *Die Deutsche Essigindustrie*, XV J., N. 14, pp. 105-106, Lübeck, April 7, 1911.

Hungary This is the description of a new receptacle which was patented under the number 240356, on December 21st, 1910, by the firm of Joseph Frish & Sohn, of Tapolcza.

The specification states that the bottom, lateral walls and, sometimes, the anterior and posterior walls of this receptacle are of reinforced concrete, the remainder being made of wooden staves which are solidly joined to the concrete, so that the air may enter the receptacles through the pores of the wood.

1277 **Müller's New Sack Lifter.** — *The Implement and Machinery Review*, London, February 1, 1911.

Great Britain: Scotland Messrs. A. Müller & C° of West North Street, Aberdeen, have constructed a new sack lifter which should be of much assistance to grain and flour merchants, millers and farmers and would considerably lighten the labour of loading, besides conducting that operation economically. The full sack is placed either by hand or with the help of a sack barrow, on to the stationary platform of the lifter. By pulling down the lever with the hands, the sack is lifted to any height which enables it to be easily removed on a man's shoulders.

The appliance can also be converted into a sack barrow. It is estimated that a saving of some 50 % in labour can be obtained, and the apparatus permits of the rapid handling of material.

PLANT DISEASES

NOXIOUS INSECTS AND OTHER PESTS.

INTELLIGENCE

Phytopathological and Entomological Stations.

F. GUITEL. **The Entomological Station of the Rennes Faculty of Science since its Foundation** (La Station entomologique de la Faculté des Sciences de Rennes, depuis sa fondation). — *C. R. du Congrès des Sociétés savantes en* 1909 (*Sciences*), pp. 257-262, Paris, 1910. **1278**

France

Until 1904, France had only three official laboratories for entomological work, which were:

1) The Paris Entomological Station dependent on the Ministry of Agriculture, with headquarters at the Agricultural Institute. It was founded in 1894 and is under the direction of M. Paul Marchal.

2) The Entomological Laboratory of the Montpellier Agricultural School, which is directed by M. Valéry Mayet. This laboratory studies especially the insect pests of vines and olive trees.

3) The Regional Laboratory of Agricultural Entomology, Rouen, founded and directed by M. Paul Noel.

These three establishments do good service but they are too few in number for a large country like France, and, moreover are either too specialised, or too little known to the public. To overcome these difficulties the Rennes Entomological Station was founded. It was annexed to the Zoological Laboratory of the Faculty of Sciences by a decision of the Council of Rennes dated April 22, 1904.

From its foundation to December 31, 1908, this station has supplied gratis no fewer than 2587 notices.

Since 1910 the Station has been in a position to take up experimental work, having removed to new premises, which comprise:

1) A workshop for the construction and repair of breeding apparatus;

2) A laboratory and office combined for the use of the Director of the Station;

3) A museum, containing collections of insect pests and specimens of the damage caused by them, as well as a collection of apparatus for destroying them.

4) Two basements for winter cultures.

5) A large kitchen garden, about 16 *ares* (1600 sq. metres) in area, forming a good field for experiments.

6) A greenhouse for a large number of cultivations.

7) A cement tank for the biological study of aquatic insects.

Amongst the gifts sent to the Station may be mentioned the splendid collection of Lepidoptera as well as a complete set of his works presented by Mr. Charles Oberthür. And it is due to the liberality of Mr. René Oberthür that in the Station there is a young entomologist capable of assisting, and if necessary, replacing the technical Sub-Director.

The example set by Rennes is beginning to be followed, for the Universities of Lille and Nancy have hastened to organise services for giving information as to the best means of destroying insects.

Non-parasitic Diseases of Plants and their Control.

1279 O. SCHREINER. **Organic Substances which are injurious to Plants.** (Symptoms shown by Plants under the influence of different Toxic Compounds). *Proceedings ot the American Society of Biological Chemists. — The Journal of Biological Chemistry*, Vol. IV, No. 2, pp. XIII-XIV (VIII-XL). Baltimore, Ma. April. 1911.

United States

Some experiment made on the modifications caused in the growth of wheat stalks by differents organic substances, show that toxins have a specific effect in changing certain definite and characteristic functions of plants.

For example, when plants are treated with coumarine, the leaves become stunted, broad and distorted.

Vanilline considerably arrests the growth of roots.

Quinine has a contrary effect to coumarine on plants; the growth is stronger and straighter, while the leaves are thin and narrow.

These varied effects of toxic compounds are entirely neutralised by different fertilisers; the effects of coumarine by phosphates, vanilline by nitrates and quinine by potassium salts.

While the plants are under the action of these toxic substances they absorb these salts in different ways, thus showing that the poisons influence the entire metabolism.

Some previous studies on plants and toxic compounds had been made, but they failed to show that the plants were affected in any special manner by the different poisons. The idea has been put forward that plants, like animals, show characteristic symptoms with specific poisons, that is to say there is a plant pharmacology just as there is an animal one.

Since it is a fact that substances can cause changes in certain definite characteristics of plants, such as distorsions, changing of metabolism, etc., the natural conclusion arises that dangerous organic substances contained in the soil or in the plants themselves, may be the direct or indirect cause of some little known physiological maladies.

P. Passy. **Treatment of Fruit Trees** (Traitement d'arbres fruitiers). — *Revue Horticole*, 83^e^ année, N. 6, p. 129-131, Paris, 16 mars 1911 **1280**

France

After describing the appearance of a chlorotic plant, Mr. Passy remarks on the analogy between the chlorosis of trees and the anaemia of human beings; and as iron is used in anaemia, so it has also been used in chlorosis (1).

In certain cases, the results obtained by this treatment were favourable, but they were rather irregular and always transient.

Nevertheless, in consequence of the improvement obtained, it was concluded that the iron was assimilated by the plant and was directly useful to it. But analysis shows that chlorotic plants sometimes have more iron than the others, and that those treated with sulphate of iron may have less than non-treated ones.

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(1) The old experiments of Eusèbe Gris had shown the correlation between iron and the formation of chlorophyll. He proved that a chlorotic leaf of maize or of any other plant when washed with iron sulphate, recovers its green colour by the local formation of chlorophyll. These experiments led to the use of ferrous sulphate as a remedy for the chlorosis of the vine. See E. Gris, *De l'action des composés ferrugineux sur la végétation*, 1843, and 1844; and W. Pfeffer, *Pflanzenphysiologie*, Leipzig, 1897, I, Th. 421. (*Ed.*).

The chlorotic leaves and shoots have less total solid matter than the healthy ones, and this want of dry matter chiefly affects the carbon and the nitrogen. The content in ash, on the other hand, is above normal; these ashes are principally charged with silica, while the proportions of potassium and of phosphoric acid are too small.

Now, chlorophyll, a nitrogenous substance, is lacking in chlorotic plants, and in consequence of this they cannot carry out their chlorophyllian functions, in other words, their content in carbohydrates is very small, whilst by respiration they lose the normal amount of carbon, and consequently become more and more impoverished.

Chlorosis is therefore the result of bad nutrition, in which certain elements are too abundant and others too scarce.

If there is no doubt as to the action of iron salts and particularly of iron sulphate, yet the manner of its action is not understood; moreover, this action is so uncertain that it is better to try to modifiy the nature of the soil according to the plants.

For some time, however, experiments have been made with iron sulphate in a dry state introduced into the body of the tree. The method is to bore a hole through the tree with an auger whose diameter is one tenth of the trunk's, until the pith is reached, then to fill up the hole with sulphate of iron to the inner edge of the bark and plug with grafting wax.

This treatment, recommended by Dr. Mokrzecki, should be done as a rule in May. Up to the present, the results are satisfactory.

1281 A. Hollick. **Factory Smoke.** (A maple tree fungus). — *Proceed. Staten Isl. Assoc. Arts and Sci.*, 2 (1909). No. 4, p. 190; Abst. Experiment Station Record, vol. XXIV, no. 4, p. 342. Washington, 1911.

United States: New York

The writer calls attention to the death of the *Acer saccharinum* along the southern side of Staten Island, New York. This tree is killed by the smoke from the factories which makes the leaves and branches fall off. In the wounds thus formed, an infection is developed, especially that of the *Pyropolyporus igniarius* which completes the destruction of the trees.

Parasitic Diseases of Plants. Parasitism. — Bacteria and Fungi as Parasites and Saprophytes. — Remedies.

1282

P. VOGLINO. **The Fungous Parasites of Some Plants observed round Turin in 1910.**(I funghi parassiti delle piante osservati nella provincia di Torino e regioni vicine nel 1910). Estr. dagli *Annali della R. Acc. di Agric. di Torino*, Vol. LIII, p. 38. Torino, 1911.

Italy: Piedmont

On the fungi which attack the crops in the province of Turin and the neighbouring regions, M. Voglino declares that in 1910, a very wet year, the conditions were favourable to the development and propagation of parasitic diseases.

He names more particularly the following amongst these: The « gummosis » on the trunk of the peach tree; *Bremia Lactucae* Reg. on *Dimorphotheca aurantiaca*, a nornamental plant; *Sclerotinia Libertiana* Fuck. on *Scorzonera, Helianthus, Daucus Carota, Brassica, Solanum*; the perithecial form of *Sphaerotheca pannosa* Lév. on the branches of the peach tree; *Rosellinia radiciperda* M. on the trunk of the apple tree; *Gibellina cerealis* Pass. on wheat; *Macrosporium parasiticum* Thüm. on onions; *Nectria ditissima* Tul., very injurious to the apple tree; *Gibberella moricola* (De Not.) Sacc., injurious to young mulberry trees; *Gloeosporium fructigenum* Berk. on the fruit of the pear tree; *Scolecotrichum melophthorum* Prill. and Dell. very injurious to pumpkins, and two new forms: *Botrytis parasitica* Cav. f. *Armeriae* on the flower tops of the *Armeria magellensis* cultivated in the alpine Garden « La Chanousia » in the Little St. Bernard and *Ramularia Doronyci* Vogl. on *Doronycum scorpioides* and *Doronycum Olonum* cultivated also in « La Chanousia ».

1283

HITIER. **Vine Diseases and the Vintagè Decrease in France** (Causes of the Decrease in 1910) (Les maladies de la Vigne et la diminution de la production vinicole en France en 1910 (Causes de la diminution de la récolte des vins en 1910). *Bulletin de la Société d'Encouragement pour l'industrie Nationale*, année 1910, 1er. sem., tome 115, N. 3, pp. 403-404. Paris, mars 1911.

France

M. Prosper Gervais gives the following reasons for the vintage decrease in 1910; at first, there was a series of spring frosts; then, suddenly, repeated attacks of mildew just before blossoming; and lastly formidable and constantly increasing invasions of Cochylis and Eudemis.

The chief causes of these troubles were the excessive damp of spring and summer, which encouraged all kinds of cryptogamic diseases, as well as the most destructive insects.

The attacks of mildew had never been so repeated, so frequent, and so serious. Favoured by an exceptional temperature and by incessant rain, they did not give the vine-dresser time to look for them, nor the chance of defending himself. The germs multiplied so rapidly, and were so widely disseminated that all the organs of the vine (leaves, branches, shoots, fruit) were attacked, and mostly destroyed in the majority of cases, the treatment with copper salts hitherto recommended appeared to be so inadequate that their efficiency has been called in question in various quarters.

This fear is happily unfounded; it has been proved that, if in some exceptional cases, the severity of the cryptogamic attacks baffles all foresight and calculation, they can nearly always be successfully controlled by repeated preventive treatments.

It is quite otherwise with the struggle against certain insects, such as the Cochylis and the Eudemis, because up to the present the whole system of treatment is faulty.

For the first time the South has felt the attacks of the Cochylis to such a degree, that M. Prosper Gervais speaks of certain estates where, owing to the ravages of these insects, nearly three quarters of the vintage was ruined, and of others where the destruction was almost complete.

1284 R. SARCIN. — **Mechanical Determination of the Resistance of Cereals to Diseases and to the Attacks of Insects.** (Determination méchanique de la résistance des céréales aux maladies et aux attaques des Insectes). *La Défense Agricole et Orticole*, 8e année, n. 334, pp. 230-231. Amiens, 9 avril 1911.

Austria: Bohemia

It is known that cultivated plants vary in their resistance to diseases and to insect attacks. Dr Stranak of Prague has shown that the inroads of either stand in close relation to the anatomy of each plant. As a matter of fact, healthy ones have a thicker and more compact cellular formation of the cortical layer, and so are less open to the causes of the evil. The differences in this formation have been determined by means of an apparatus, which tests them mechanically by imitating in its action the work of the enemies of the plants.

Here are some of the figures collected by him in 1910:

	Resistance to piercing expressed in grammes.	Thickness of the cortical layer. μ	Thickness of the external membrane of the epidermal cells. μ	Percentage of stalks attacked by the larva of *Chlorops taeniopus* (Gout Fly).
Old Bohemian Wheat. .	260	1.3	4 to 8	0
Ruska Wheat.	220	1.0	3 to 5.5	5
Bordeaux Wheat.	125	0.8	2 to 3	50
Square Head.	120	0.6	1.6 to 3	50
Fratusitz Wheat.	90	0.6	1	80
Podbiellzy Wheat	36	0.5	1	90

It is clear from this table that the plants' susceptibility to the *Chlorops* stands in inverse ratio to the hardness of the haulms and their anatomical structure.

1285

VERMOREL and E. DANTONY, **The Fungicidal Spraying Mixtures.** (Sur les bouillies anticryptogamiques mouillantes). *Comptes-rendus Hebdomadaires des Séances de l'Académie des Sciences,* Tome 152, No. 14, pp. 972-974, Paris, Avril 3, 1911.

France

Messrs. Vermorel and E. Dantony have made a number of experiments with the object of finding some fungicides with strong wetting power obtained from the sodium oleate in soap.

Last year they recommended the use of mixtures containing silver soaps with an excess of soluble alkaline soap. The wetting power of the cupric mixtures may also be increased by the addition of soap.

In a preliminary series of experiments the writers prepared some Burgundy mixtures from the following solutions:

1) 2 kgs. of copper sulphate dissolved in 50 litres of water (5lbs to 11 gals);

2) 2 kgs. of commercial sodium carbonate dissolved in 50 litres of water.

The sodium carbonate used was of such purity that the excesses of alkali was 400 grs. per hectolitre (4 $^{0}/_{00}$).

Mixture A. — If the solution of sodium carbonate is poured all at once into the copper sulphate, a precipitate is formed (without the liberation of carbon dioxide) which reacts on the excess of sodium carbonate and then on the copper salt, so that the mixture thus prepared finally contains insoluble copper hydrocarbonate and soluble copper bicarbonate.

Mixture B. — If, on the other hand, the sodium carbonate is poured slowly, carbon dioxide is liberated and the mixture thus prepared contains insoluble copper hydrocarbonate and sodium carbonate in excess.

If 1000 grs. (2.2lbs) of white soap containing no alkaline carbonates but a high percentage of oleate is added to mixture *A*, the superficial tension of the liquid is such that 5 cc. furnish 85 drops (drop-bottle giving 66 drops of distilled water). This superficial tension does not change on standing.

Now, it is sufficient to add only 100 grs. (3.502) of the same soap to mixture *B*, ln order to obtain the same superficial tension. But the superficial tension of the mixture *B* changes in time; it gives only 83 drops at the end of three hours.

The mixture *B* with 1000 grs. of soap gives 151 as soon as it prepared; 139, twenty minutes after; 100, six hours after; and so on, tending towards the limit 85 of mixture *A*.

We see therefore:

1) That the same wetting power can be obtained with quantities of soap of 100 grs. or 1000 grs. per hectolitre accordding to the rapidity with wich the sodium carbonate is added.

2) That, notwithstanding 1000 grs. of soap per hectolitre, mixture *A* has practically no wetting power while mixture *B* is much better.

3) That great attention must be paid to the decrease of the wetting power. Mixture *B* containing the 1000 grs. of soap wets the bunches of grapes as soon as prepared, but twenty minutes later does not wet them at all..

1286 STORMER. **Rust in Seed Corn: the Remedy.** (Die Beizung der Saatgetreides gegen Flugbrand). *Mitteilungen der Landwirtschaftskammer für das Herzogtum Gotha,* N. 5, S, 33. Gotha, März 11 1911.

Germany: Gotha

The « rust » on spring wheat and barley cannot be prevented by treating the grain with Bordeaux mixture. But treatment with warm water or boiling steam is effective; the latter method however requires special apparatus.

Spring wheat must be soaked in warm water at 30° C. (86° F.) for five or six hours, and barley in warm water at 25° C. (77° F.) for the same length of time. The grain put loosely into sacks so that it can swell freely, is plunged into the barrels containing the water.

At the end of five hours, the swollen grain is put for a few minutes into water at 50° C. (122° F.), then it is spread out to cool and dry on the floors of chambers where the temperature is 30° C. (86° F.),

A. DESFLASSIEUX. **Zinc arsenate.** (*L'Arseniate de Zinc*). — *Progrès Agricole et Viticole,* No 12, pp. 358-359. Montpellier, Mars 19, 1911. **1287**

France

Amongst the arsenical compounds used in viticulture, lead arsenate is the most recommended on account of the addition of the poisonous properties of lead to those of arsenic.

But this salt is dangerous to handle and it may cause some serious accidents by lead poisoning. The writer thinks it could be replaced by zinc arsenate, the salts of which are less poisonous and have, otherwise, various advantages. Zinc arsenate is lighter than the lead salt; it does not precipitate in the cupric mixtures, even if used in excess. Zinc, like the heavy metals, silver, lead, copper, etc., also has an anticryptogamic action which might strengthen the treatment against mildew.

Tha formula recommended for trial is the following:

Anhydrous sodium arsenate	grs.	200 (7.oz.)
Commercial zinc sulphate	»	475 (1lb. 1.oz)

It is mixed with the cupric mixtures so as to make 100 litres 22 gals.) in all.

MARCILLE. **On the Action of Sulphur used to Control Oïdium** (Sur le mode d'action des soufres utilisés pour combattre l'Oïdium). — *Comptes-Rendus de l'Academie des Sciences,* T. 152, N°. 12, pp. 780-783. Paris, Mars 20, 1911. **1288**

France: Tunis

The object of Mr. Marcelle's researches at Tunis was to determine the manner in which sulphur acts as a fungicide. The spontaneous volatilisation of sulphur is of very small importance; its spontaneous oxidation could not, according to the writer, produce a quantity of sulphur dioxide capable of exercising any toxic power. The quantity of sulphuric acid produced spontaneously through the action of damp, light and the renewal of the air is very small, and its efficacy is at least disputable.

In his opinion, the sulphur acts on the oïdium only through the sulphuric acid that it contains already formed, especially when it is in the insoluble state of carbon disulphide. This hypothesis explains, just as well as the results obtained by Mach (1), the fact that the sulphur destroys the oïdium *in situ*, inasmuch as the sulphuric acid can be reduced to sulphurous acid by the action of the organic matter. The same hypothesis takes into account the specially efficacious action of extra sublimated sulphur which contains considerable quantities of sulphuric acid.

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(1) This writer found sulphur dioxide in quantity proportional to the surrounding temperature of the air in some vineyards which had been treated with sulphur.

See VIALA, *Les Maladies de la Vigne,* p. 42, 1893. (*Ed.*).

For the farmer, the practical result of these researches would be the saving of expense, by the commercial preparation of sublimated sulphur containing more sulphuric acid than that at present supplied.

1289 **The control of the *Cycloconium*.** See No. 1185 of this Bulletin.

Parasitic Diseases of various Plants and means of Prevention and Cure (1).

1290 EM. MIÈGE. **Vegetable and Animal Parasites of Buckwheat (Fagopyrum)**. (Recherches sur les principales espèces de *Fagopyrum* (Sarrasin). — *Imprimerie des Arts et Manufactures*, 426 pp., 1 pl. (Chapter IV: Pathologie, pp. 413-417, fig. 152-153), Rennes, 1910.

France: Brittany

Mr. Miège remarks that all works on agriculture are unanimous in declaring that buckwheat (*Fagopyrum*) has neither enemies nor diseases (2). This assertion, however, must be regarded as at least exaggerated. As a matter of fact, if the crop has practically never been seriously damaged by vegetable or animal parasites, it is none the less true that the plant is not free from their attacks.

Amongst the vegetable parasites, Prillieux notes the presence on the leaves of *Phytophthora omnivora*, and Saccardo mentions 7 fungus parasites of *Fagopyrum esculentum: Ascochyta Fagopyri, Botrytis vulgaris, Depazea polygonicola, Didymella Fagopyri, Humaria Patouillardi, Puccinia Fagopyri, Ramularia curvala.*

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(1) The plants are put in the same order as in the first part of this Bulletin.

(2) For a list of diseases and pests of buckwheat, see: O. KIRCHNER - C. NEPPI, *Le malattie ed i guasti delle piante agrarie coltivate*, Torino. 1901, p. 94.

In 1908, the writer found on some crops of gray buckwheat (1) in the neighbourhood of Rennes, numerous evidences of the attacks of *Ramularia curvala.*

In 1910, in the experiment fields of the National School of Agriculture at Rennes he found two new diseases of *Fagopyrum* caused by a *Peronospora* (which appeared to be very similar to the *P. Polygoni*) and by a *Heterosporium.* A *Cladosporium* and a *Botrytis* were often associated with these two cryptogams.

These diseases appeared in the first days of July, and spread very rapidly. They mainly attacked *Fagopyrum emarginatum* and *F. esculentum* while *F. tartaricum* and *F. stenocarpa* suffered very little.

The damage was greatest and most extensive on clayey soils. Under these conditions, the plants are often puny and more or less stunted, with small and frequently deformed leaves. The least harm was done those growing in sand. The actual death of any plant was, however, very rare.

On July 10th, these diseases appeared on some young seedlings of various buckwheats, situated at a short distance from the fields which had been previously infected, and their dissemination was very rapid. They seemed to be localised on the leaves, and on the organs already diseased were found traces of *Cladosporium* and *Botrytis,* the appearance of which seems to be consequent on that of the cryptogams *Peronospora* and *Heterosporium.*

At a later date, the writer found the same diseases on some buckwheat crops in other localities.

Amongst the animal parasites, a Nemathelminth (*Tylenchus devastatrix*), was found on the stems of *Fagopyrum esculentum.* It caused very serious damage in certain years, and had already been observed on buckwheat.

During the summer of 1907, it was found in abundance in many crops of *Fagopyrum* in the district of Fougères (Ille-et-Vilaine) and especially where buckwheat had succeeded clover, carrots or turnips.

T. Petch. **Root Diseases of Tea.** *Circulars and Agricultural Journal of the Royal Botanic Gardens, Ceylon,* vol. 5, No. 11, pp. 95-144, Colombo. Oct. 1910. **1291**

Ceylon

In 1903 the Royal Botanic Gardens of Ceylon sent out a circular on the root disease of the tea plant (*Rosellinia*), and since then it has been found that the facts mentioned relate to several root diseases, five of which have been extensively studied. These diseases, in order of importance, are caused by: *Ustulina zonata* Lév; *Hymenochaete noxia* Berk.; *Poria hypolateritia* Berk.; *Botryodiplodia Theobromae* Pat.; *Rosellinia bothrina* B. and Br.

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(1) A variety of *Fagopyrum esculentum.* (*Ed.*).

The distinguishing marks of these five diseases are given below. They may be divided into two classes: in the first the mycelium is visible on the exterior of the root, while in the second the root is perfectly clean.

I. External Mycelium present on the Root:

a) Tawny brown mycelium, cementing stones and sand to the root in a thick crust: *Hymenochaete noxia.*

b) red and white mycelium, in solid patches and strands adhering closely to the roots: *Poria hypolateritia.*

c) mycelium at first cobwebby and gray, afterwards forming black strands on the roots, and white stars between the wood and cortex: *Rosellinia bothrina.*

II. No External Mycelium:

a) Mycelium running between the wood and the cortex in white fan-shaped patches: *Ustulina zonata.*

b) No mycelium visible between the wood and the cortex; at the end of some days the root is covered with a black powder: *Botryodiplodia Theobromae.*

I. *Hymenochaete noxia.* This is in fact an omnivorous disease which attacks the *Hevea*, Cacao, Tea, Dapap, *Castilloa,* Cotton Cavaronica, Coca, *Cinnamomum, Cassia,* etc. in Ceylon.

In other countries it has been found on the bread-fruit trees and *Albizzia stipulata* in addition to the other species which have been mentioned, and specimens found on the *Funtumia* have recently been received from the Gold Coast.

When attacked by this disease, the roots of the tea-plant become incrusted with a mass of sand, earth, and small stones to a thickness of 3 or 4 mm.; the crust extends up the stem for 2 or 3 inches.

Later on, the wood acquires a honey-comb structure. The fructification is rare. The mycelium spreads from the dead bush to others, therefore dead bushes should be dug up and burnt, and it is advisable to fork in quicklime over the affected spots.

II. *Poria hypolateritia.* This disease is one of new clearings and is more prevalent on old *chena* land than on land which was virgin jungle. It has attacked newly-planted fields in the Kandy, Kegalla and Kelani Valley districts and also in the southern Province.

The bushes attacked are from 2 to 3 years old. Their roots are covered by a compact mycelium, red externally; black patches also occur.

When the malady has existed a long time, the wood becomes soft and gelatinous. The wood of a young root is little affected.

The spores of the fungus are produced within tubes, which are short and form a soft layer seated on a red solid substratum in the form of a plate.

III. *Rosellinia bothrina.*

This is the least common tea root disease. Its most remarkable feature is the extraordinary spread of the mycelium, which can travel three or four yards in a week; it advances in the top two or three inches of the soil, and when it reaches a tea-bush, goes down the root for a distance of about a foot. While the underground mycelium is killing the root, that at the surface forms a sheet round the stem; it is first purple-gray, and then black. The sheet extends to about 6 in. above the soil.

The fungus has at least two forms of fructification - a conidial and a perithecial stage; the latter occurs on every tea-bush attacked.

The perithecia are produced after the plant has been dead a long time.

The disease is conveyed by means of spores, and the ground is permeated by mycelium.

The bushes should be scorched and then dug up and burnt, quicklime forked into the bare soil, and scattered in the trenches. Infected patches must not be replanted within 18 months.

IV. *Ustulina zonata* Lév. This is the commonest tea root disease in Ceylon, and is in great measure preventible, as it usually spreads to the tea-bushes from old Grevillea and Albizzia stumps.

The Grevillea trees should be felled in such a way as to leave the «stump» a foot below ground, and a trench should be dug round the stumps of old Albizzias, cutting through all the lateral roots; young plants can be uprooted.

Ustulina zonata is one of the most protean of fungi, but as a rule, the mycelium forms fan-shaped white patches overlying the wood, which often blend into a sheet. It has two kinds of spores, one produced in asci, and the other at the apices of stalks.

V. *Botryodiplodia theobromae.*

The most usual feature of this complaint is the death of apparently healthy bushes after pruning.

It is chiefly a low-country disease, though cases have occurred at an elevation of 2000 ft.

The mycelium runs within the cells of the wood and bark; it produces blackish-brown discolouration.

The fructifications are minute, black, spherical bodies imbedded in the bark and invisible from the exterior, the spores are oval and divided across the middle.

The two main sources of the infection of tea bushes are buried prunings and dead Albizzias.

The dead tea-plants should be up-rooted and burnt with the help of kerosene, and the affected soil forked over with quick-lime.

1292 L. D. LARSEN. **Diseases of the Pineapple.** — *Pathological and Physiological Series.* Bulletin No. 10. Report of Work of the Experiment Station of the Hawaiian Sugar Planters' Association. 8°, p. 70, Honolulu, Hawaii, Dec. 1910.

Hawaii *Thielaviopsis paradoxa* (1) is the most widely spread and destructive fungus connected with the pathology of the pineapple. It is the cause of three diseases: the Soft Rot of the fruit, the Base Rot of the cuttings, and the Leaf Spot. It is also largely responsible for the decay which occurs in the roots.

The following preventive measures have all been used with success: Cut the fruits leaving long stems and a portion of the bractea, use straw as packing material, wrap the fruit in paper and fumigate with gaseous formaline.

Brown Rot. At Hawaii, there is one, perhaps several, species of *Fusarium* which may cause this disease, characterised by brown discolorations in the tissue of the fruit. The infection occurs mainly, if not exclusively, when the pineapple begins to ripen. Stockdale reports that a species of *Penicillium* causes trouble of the same kind in the West Indies; in Queensland a similar disease, due to a *Penicillium*, attacks the smooth Cayenne variety while the Prickly variety is attacked by a species of Monilia accompanied by an Acarus.

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(1) *Synonyms.* The name which has been commonly adopted for this fungus is: *Thielaviopsis ethaceticus.* It was used for the first time by F. A. F. G. Went in 1893 in connection with the Pine-apple disease of the sugar-cane in Java.

In 1904 Dr. Von Höhnel drew attention to the fact that the fungus called *Thielaviopsis ethaceticus* by Went in 1893 had been described by de Seynes in 1886 under the name of *Sporoschima paradoxa* and by Saccardo in 1892 as *Chalara paradoxa.* Von Höhnel considering that a special genus would represent the position of this fungus better that the genera *Sporoschima* or *Chalara* adopted the name *Thielaviopsis* first given by Went to the genus, keeping *paradoxa* as the name of the species, and called the fungus *Thielaviopsis paradoxa* (De Seynes) V. Höhnel.

Ripe Rot. This disease is produced only when the fruit is perfectly ripe. Therefore it is only dangerous when the pineapples are carelessly gathered. The experiments made by. Mr. Larsen show that *Thielaviopsis* is capable of living and penetrating some distance into the soil. An increase of organic matter leads to a more rapid growth of the fungus. The experiments also show that the pineapple and sugar cane *Thielaviopsis* are specifically the same.

The following are the diseases which attack the pineapple in Hawaii :

The *Thielaviopsis* Fruit Rot or Soft Rot. It may attack the fruit in the fields or in the large preserving factories, but generally appears in the packed fruit during transport. The fungus *Thielaviopsis paradoxa* is alone responsible for this disease. It is capable of penetrating to the interior of the pineapple, even if the surface of the latter be sound, provided the weather is damp enough, and it attacks the green and ripe fruit indiscriminately.

There are at least two other organisms besides the *Thielaviopsis* which cause forms of rot in the pineapple that are quite distinct from the disease produced by the *Thielaviopsis*.

Certain insects, by puncturing the surface of the fruit, distribute the spores of the fungus from place to place. The « mealy bug » (*Pseudococcus Bromeliae*), the « fruit beetle » (*Carpophilus humeralis*), certain « vinegar flies » (*Drosophila ampelophila* and others) and a grasshopper (*Xyphidium varipenne*), are the most important of these insects.

Sun Scald or *Sun Burn.* This is a disease caused directly by the solar rays on the pine-apples, which have been planted in such a way that one side is constantly exposed to their action. The flavour and texture of the inside being also affected. It occurs frequently in Hawaii, and has also been found at Porto Rico and in some other pineapple growing countries and may be prevented by sheltering the fruit.

Base Rot of Cutting. Characterised by the rot which attacks the plants as soon as they are planted. It begins by the decay of the lowest leaves and the underground parts ; later on it spreads to the central leaves, which ordinarily remain green after the roots and the lower leaves are completely decayed. The fungus *Thielaviopsis paradoxa* is the cause of this disease. W. V. Tower found it at Porto Rico in 1906.

Heart Rot. This is characterised by the rotting of the heart of the plant, including the tender tissue at the base of the most recently formed leaves. Very often the plants attacked give one or more off-shoots, which grow into sound plants.

The Pineapple Leaf Spot.. The *Thielaviopsis* attacks the leaves through the wounds made by insects (the commonest of these is a grasshopper, *Xyphidium varipenne* Swezey) and by the serrated edges of neighbouring leaves. It causes large discolorations or spots which often spread over the entire leaf, and kill it. Although the harm done to each tree is comparatively small, the total damage is considerable. It is probable that the Leaf Spot found at Porto Rico is identical with that at Hawaii.

Wilt. The wilting of the pineapple is generally considered to be its most serious disease. The most characteristic symptom is a loss of rigidity in part of the leaf, which gradually droops and decays. There is very little known at present as to the cause of this malady. It is generally believed that it is like the decay of the cotton plant, and is caused by a fungus which penetrates the roots and develops in the main stem of the plant. The disease is known in all parts of the world where the pineapple grows.

Tangle Root. After wilting, Tangle Root is the disease most frequently found in the pineapple. The leaves turn yellow, beginning at the tip, and gradually this colour spreads all over the plant, which then begins to wither and dry up. The growth of leaves at the base of the plant and a poor soil are generally the cause of the stunted growth of the lateral roots. The remedy is to attend to the cultivation and to clear away the plants affected.

Parasitic Root Fungi. Thielaviopsis paradoxa, Trichoderma lignorum and a species of *Fusarium* are the fungi which appear most frequently in the root cultures of decayed pineapples. The *Tielaviopsis*, however, is the only one that completely destroys the roots, which it does in an exceedingly short time, if injected into the tissue.

Nematode Root Galls. Heterodera radicicola, which attacks a large variety of crops in nearly every part of the world, also forms galls on the youngest roots of the pineapple. The following remedies have been tried: the use of snare-plants (a mustard *Brassica Rapa rapifera* Wetzg., and the common garden nightshade *Solanum nigrum* were used); the application of chemical substances to the soil, which is of little value, however, from a practical point of view; tilling and harrowing the ground during a long period of drought, which gives good results when the atmospheric conditions are suitable. Sterilisation by steam is a very efficacious method, but unhappily cannot be employed in fields.

Manganese Yellow. This disease is characterised by the yellow appearance of the plant. The fruit, when there is any, is very poor in quality and size. The presence of large quantities of manganese in the soil is in all probability the cause of the malady.

Diseases unknown at Hawaii. These are the *Long Leaf* disease, found at Porto Rico and characterised by the fact that the leaves grow long and slender and remain fixed to the base, the *Sanding*, caused by the sand, which is carried along by the wind and fills up the fruit bud of newly planted trees, and the *Bitter Heart* (in Florida), the chief signs of which are that the heart seems saturaeed with water and the fruit turns bitter.

***Septoria Viciae* West.** — See No. 454 in this *Bulletin*. **1293**

R. Laubert and M. Schwartz. **Diseases and Enemies of the Rose Tree.** (Rosenkrankheiten und Rosenfeinde). — *Eine Anleitung, die Krankheiten und Feinde der Rosen zu erkennen und zu bekämpfen*), pp. VI + 59, 1 Taf. Jena, G. Fischer, 1910. **1294**

Germany

The object of this monograph is to provide a guide for recognising and controlling the chief vegetable and animal parasites of the rose tree.

In the first part of the work, which has been executed by Mr. Laubert, the following diseases will be found:

1) *Phragmidium subcorticium* (Schrank) Winter (Rose-rust).
2) *Sphaerotheca pannosa* (Wallr.) Lév. (Rose-mildew);
3) *Actinonema Rosae* (Lib.) Fr. (Rose leaf-blotch);

These three fungi damage the leaves of the rose tree.

After these come:

4) *Coniothyrium Wernsdorffiae* Laub., which attacks the bark of the branches and twigs of the rose tree;

5) the disease which completely kills the plant and is known in Germany under the name of "La France-Krankheit", because it was discovered on the "La France" variety; certain writers attribute it to physiological causes, for instance, to a degeneration of the variety, or even to traumatic or cultivation reasons; Mr. Laubert considers it is due to the presence on the roots of the plants attacked of *Roesleria pallida* (Pers.) Sacc. (= *R. hypogaea*, *Coniocybe nivea*);

6) The blackening of the peduncles ("Schwarzwerden der Rosenstiele") caused by a special form of *Botrytis*;

7) The Rose-tree Rot, caused by *Botrytis cinerea*;

8) *Peronospora sparsa* Berk. (False mildew);

9) Canker of the rose-tree, which seems due primarily to the damage caused to the branches by frost.

In the second part of this publication, Mr. Schwartz enumerates the diseases caused to the rose-tree by animal parasites, and mentions the different means of controlling them; there are four categories as follows:

I. Damage to floral buds, flowers and fruit, caused by the larvae or adult insects of:

Phyllopertha horticola L. (" Buckwheat Beetle ") ; *Hybernia defoliaria* L. (" Mottled Umber Moth) ; *Cheimatobia brumata* L. (" Winter Moth ") ; *Ardis plana* (Klg.) Knw. (" Saw fly ") ; *Anthonomus Rubi* Herbst (" Raspberry Anthonomus ") ; *Clinodiplosis rosiperda* Rübs. ; *Cetonia aurata* L. (" Green Rose Chafer ") ; *Forficula auricularia* L. (" Common Earwig ") ; *Grapholitha roseticolana* Z.

II. Anomalies and damage to the leaves caused by the larvae or adults of *Melolontha vulgaris* L. ("Common Cockchafer); *M. Hippocastani* Fb. (" Horse-Chestnut cockchafer ") ; *Phyllopertha horticola* L. (" Buckwheat Beetle "); *Lymantria dispar* L. (" Schwammspinner "); *Euproctis chrysorrhoea* L. (" Brown-Tail Moth "); *Malacosoma neustria* L. (" Lackey Moth ") ; *Orgyia antiqua* L. (" Common Vapourer Moth ") ; *Hybernia defoliaria* L. (" Môttled Umber Moth") ; *Cheimatobia brumata* L. (" Winter Moth ") ; numerous " Sawflies " such as *Emphytus cinctus* L., *E. viennensis* Schrank, *E. rufocinctus* Retz, *Cladius pectinicornis* Fours., *Hylotoma Rosae* L., *H. pagana* Panz.. *Eriocampoides aethiops* Fabr. ; several " Rose-leaf miners " such as *Nepticula anomalella* Goeze, *N. centifoliella* Z., *N. angulifasciella* St. ; *Coleophora gryphipennella* Bouché ; *Tortrix Bergmanniana* L. ; *Grapholitha tripunctana* F. ; *G. cynosbana* F. ; *Teras forskaleana* L. ; *Blennocampa pusilla* Klg. ; *Lyda inanita* de Vill. ; *Dichelomyia Rosarum* Hardy ; *Rhodites Rosae* Gir. (" Gall-wasp of Rose ") ; *Monophadnus elongatulus* (Klg.) Knw. (" Saw fly ") ; *Siphonophora Rosae* Réaumur (" Rose Aphis ") ; *Typhlocyba Rosae* L. ; *Tetranychus telarius* L. (" Red Spider of the Hop ").

III. Damage to branches and large shoots. produced by three " weevils " ; *Rhynchites conicus* Illig., *Rh. minutus* Gyll., *Rh. pauxillus* Germ.; *Anthonomus Rubi* Herbst ("Raspberry Anthonomus"); two " Bürstkornwespen " : *Hylotoma Rosae* L. and *H. pagana* Panz.; *Ardis bipunctata* Klg. (" sawfly ") ; *Monophadnus elongatulus* (Klg.) Knw. (" sawfly ") ; *Emphytus cinctus* L. ; *Orthotylus nassatus* Fabr. ; *Siphonophora Rosae* Réaumur (" Rose Aphis ") ; *Aulacaspis* (*Diaspis*) *Rosae* Bouché (" Rose Scale ") ; *Clinodiplosis oculiperda* Rübs.

IV. General decay of the plant, in consequence of the destruction of the root by the larvae of *Melolontha vulgaris* L.; *M. Hippocastani* Fb.; *Phyllopertha horticola* L.; Elaterides ("Skip-jacks"); Tipulides ("Crane-Flies"); *Bibio hortulanus* L. ("Fever-Fly").

P. Noel. **The *Gnomonia* of the Cherry Tree.** (La *Gnomonia* des Cerisiers). — *Bulletin du Laboratoire régional d'Entomologie agricole,* Deuxième trimestre de 1911, (Avril - Mai - Juin) pp. 9-10, Rouen, 1911. **1295**

France: Eure

In the Department of the Eure and especially in the neighbouring Communes of the Seine, Saint-Pierre-du-Rouvray, Gaillon, Vernon, etc., the cherry trees are affected with *Gnomonia erythrostoma* (1).

Mr. Noel gives the results of some experiments made by Mr. Boudehan, President of the Horticultural Society of Gaillon, who has made a special study of cryptogamic diseases.

The following treatments were used:

1) Removal of dry leaves;

2) Two light sprayings with Bordeaux mixture from the beginning of the vegetative period.

The results were as follows:

1) Removal of dry leaves only: The trees treated in this way had magnificent foliage, and the fructification was good. Those attended to in October were better than the ones left until March and April,

2) Sprayings only: The disease seemed to decrease somewhat. The trees put forth shoots and produced sound fruit, but the results were not so good as those obtained by plucking off the dry leaves.

3) Plucking off leaves and sprayings. Very good results especially on the trees which had not been diseased for more than two or three years, and a noticeable improvement in those much affected.

The disease is very contagious, and care should be taken to attend to all the trees in a district.

Those which are well manured and freed from caterpillars are better able to fight against the malady.

Mr. Boudehan found that considerable havoc had been caused by the fungus in the Lower Seine, Sologne, Périgueux and the South of France as well as in the plains of Gaillon.

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(1) See this Bulletin for March 1911, n. 1025.

1296 N. PATOUILLARD. **The Root disease of Cocoa Nut Palms. Disagreements of Writers in Regard to the Fungus Which Causes the Disease: *Botryodiplodia, Fomes* or others? The only Treatment is to Pull Up the Roots.** (La maladie des racines du Cocotier. Divergences des Auteurs sur le champignon, cause de la maladie: Botryodiplodia, Fomes ou autres? Le seul traitement est l'arrachage). — *Journal d'Agriculture Tropicale,* IIe année, No. 117, pp. 65-66, Paris, Mars 31, 1911.

Ceylon: Antilles, etc.

One of the most serious diseases which threaten the cocoa plantations is the " root" disease " (1).

This trouble appears to exist in all countries where the cultivation of the cocoa tree is of an extensive character; in British Antilles, Java, the Philippines, Ceylon, India, East Africa, etc.

The trees are attacked here and there throughout the plantations, sometimes singly, sometimes in little groups. The outer leaves begin to turn yellow, then they wither and curve outwards until they hang vertically to the stalk; the other leaves quickly suffer the same alteration, while those in the centre decrease in number and size, and finally wither. The tree does not produce any fruit, because the floral branches are destroyed.

The " root disease " is by common accord attributed to a fungus which attacks this organ directly.

In the Antilles, Stockdale found on the roots a brownish mycelium without fructification, and he considers the receptacles of a Botryodiplodia which developed on the petiole of the diseased leaves to be the fructification of the root fungus.

This supposition is not supported by any proof, according to Mr. Patouillard, and it is probable that the fungus of the petioles is nothing but a saprophyte.

Butler observed a similar mycelium at Travancore; the parasitic roots, placed in a culture medium in the laboratory, developed the pycnidia of a *Botryodiplodia* which is still specifically undetermined.

More recently, Petch found in Ceylon that the roots of dying trees contained a mycelium; when these roots are put under observation, they are seen to develop a series of fungi, the last of which is also a *Botryodiplodia*; it is evident that this fungus is here also a saprophyte.

On the other hand, Petch saw the filaments of a white mycelium in the vessels of the base of the trunks, which, on culture, bore the fructiferous receptacles of a higher Hymenomycete, *Fomes lucidus*. He regards this *Fomes* as the actual cause of the " root disease ". of the cocoa tree in Ceylon.

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(1) See this Bulletin for Dec. 1910, p. 368.

It is clear there is no certainty as to what fungus is the dangerous host of the roots. The only important fact which appears to stand out from observations made in the various localities, is the discovery of parasitic mycelium in the tissues of the roots.

It is practically impossible to apply fungicides without risk of killing the tree as well as its host. The use of manures can do no more than prolong the life of the tree for a little while. The only thing to be done is to uproot the diseased plant and burn the underground parts and the base of the trunk, and also to clear the ground of the woody debris which lies rotting there as a rule.

No new plantations must be made in the places where trees have died from this malady.

Fr. Bubàk. **A New Disease of the Mulberry.** (Eine neue Krankheit der Maulbeerbäume) (II Mitteilung). — *Berichte der deutschen botanischen Gesellschaft*, Bd XXIX, Heft 2, s. 70-74, 1 Abbild. im Text. Berlin, 30 März 1911. **1297**

Bulgaria

Mr. Bubàk found a Sphaeropsidean on some branches of *Morus alba* gathered by Mr. P. Tankoff at Vraca (North Bulgaria), which had developed on the old stromata of *Thyrostroma Kosaroffii* (Briosi) Bubàk.

Basing his decision on the study of this Sphaeropsidean, the discoverer has created the new genus *Dothiorellina* and the new species *D. Tankoffii*.

E. Cuif. **The Oak Oidium. Effect of the Application of Sulphur in Nurseries.** (L'Oidium du Chêne. Action du soufrage en pépinière). — *Revue des Eaux et Forêts*, Tome 50, N. 9, pp. 270-272, 1 fig. Paris, 1er Mai, 1911. **1298**

France

Since the "*blanc du chêne*" was observed for the first time in forest of Amance (Meurthe-et-Moselle) towards the end of the spring of 1908, every attempt has been made by the application of sulphur to save the plants in the nursery called the *Etang de Brin* from being attacked by the fungus. About 40 000 five-year-old oaks are taken from this nursery every year.

The first year's treatment, however, was not successful, being applied too late.

In 1909, on June 2nd and 3rd, before the appearance of the disease, some naphthalin-sulphur was spread in all the beds of the nursery where the oaks were growing, the method followed being that of alternate rows, one of which was sulphured, the other serving as control. The operation was twice repeated, at the end of July and in the middle of August.

The first treatment was in 1910; all the oaks in the nursery were treated with flowers of sulphur at three different periods, at the end of May and the beginning of July and August. The malady did not appear in the nursery, although its ravages continued on the seedling and young growth of neighbouring plantations.

In 1910 a sulphuriser (Soufreuse) was used instead of the gardeners' bellows, (Soufflet du jardinier). In a nursery of two-to five-year-old plants 5 cm. apart and placed in rows 15 cm. apart, the qnantity of sulphur used averaged 1 kg. per are for each treatment. Flowers of sulphur cost from 0.20 to 0.25 fr. per kg. and the entire cost of a treatment for 1 are, including labour and depreciation may therefore be estimated at 1 fr.

The disease may reappear on the trees planted in the forest, but the attacks will be less severe the trees being more isolated and taller.

1299 G. BRIOSI and R. FARNETI. **The "Ink Disease" of Chestnuts.** (La Moria dei Castagni ("Mal dell' inchiostro"). Osservazioni critiche ad una Nota dei signori Griffon e Maublanc). — *Atti dell'Istituto botanico dell'Università di Pavia,* Ser. II, vol. XV, pp. 43-51. Milano, 1911.

Italy

In an article entitled *Sur une maladie des perches de châtaigniers* (1) (On a disease of the chestnut coppices), Messrs Griffon and Maublanc declare that the malady described by Briosi and Farneti (2) is identical with that observed in France in the nurseries of Limousin.

The investigations mentioned in the above article, were confined to coppices, although, as the Italian writers have shown, the full-grown chestnuts in forests are equally attacked by this disease, which kills them.

Both sets of investigators found characteristic cankers on the branches of the diseased trees, a mycelium ramifies in the bark, while fructifications, in the form of a *Coryneum* and a *Melanconis*, occur upon the surface.

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(1) See No. 332 of the January *Bulletin,* 1911.

(2) See No. 635 of the February *Bulletin,* 1911.

The Italian scientists point out that the three forms of fungus which they have found on the chestnuts affected with the "ink disease", and which they have named *Coryneum perniciosum, Fusicoccum perniciosum* and *Melanconis perniciosa*, should be considered as distinct from *Melanconis modonia* Tul. and its conidian and pycnidian forms.

1800 ***Pyropolyporus ignarius*** **Injurious to the Sugar Maple.** — See No. 1281 of this *Bulletin.*

1801 W. Ransom. **Dry Rot in Timber.** — *Surveyor,* 38, (1910), No. 892, pp. 643-644 *Abst. Experiments Station Record,* Vol. XXV, No. 4, p. 353, Washington, 1911.

United States

This disease, which appears to be on the increase (1), seems to be favoured by moderate heat, by damp and by lack of ventilation; the fungus *Merulius lacrymans* almost exclusively attacks wood felled in the sap. Thoroughly seasoned timber, placed in well-ventilated conditions, is not attacked as a rule. Phenol, creosote, and carbolineum are good preservatives.

1802 **Causes of the Decreased Vintage in France, in 1910.** See No. 1283 of this Bulletin.

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(1) The abstract does not state where. (*Ed.*).

Phanerogamic Parasites and Weeds. — Their Control.

1303 ADVISSE-DESRUISSEAUX. **Influence Exercised by some Plants on the Vanilla Tree** (De l'influence exercée par quelques plantes sur le vanillier — *L'Agriculture pratique des pays chauds*, 10ᵉ année, N. 88, pp, 33-42, 5 figs., 1910. *La Quinzaine Coloniale*, 15ᵉ année, No. 5, p. 162, Paris, 10 Mars 1911. (Summary by Mr. Em. Perrot).

Java Ceylon Mayotte

Certain woody or herbaceous plants, when they grow in the neighbourhood of the vanilla tree, have a very injurious influence on the latter, while others, under the same conditions are useful to it and are therefore sought after by planters.

Injurious plants: Jack bread-fruit tree (*Artocarpus integrifolia*) "Affouches" (*Ficus cinerea, F, lucens, F. rubra, F. terebrata*), *F. mauritiana, F. sororia, F. elastica,* the bread-fruit tree (*Artocarpus incisa*) and the Rimier (*A. nucifera*).

The vanilla does not feel the influence of the supporting tree until its adventitious roots are in contact with the living tissue of the latter. The injurious influence is attributed to the sap, or rather to the latex, of these plants.

Useful plants. — The best known of these are herbaceous: several species of *Oxalis* and *Hydrocotyle asiatica.* They have a double role; the maintenance of a constant moisture which prevents any direct action on the roots of the vanilla, and the formation of a favourable humus.

Bananas are also useful on account of the shade which they afford, but they must not be too numerous or they exhaust the soil.

1304 E. RABATÉ. **Destruction of Runch by Sulphuric Acid** (Destruction des Ravenelles par l'acide sulfurique). — *Journal d'Agriculture pratique*, n. 13. pp. 407-409, Paris, 30 Mars 1911.

France

For a long time the only way of destroying runch (1) was harrowing. Copper sulphate was then used with success, and at present the practice of using sulphuric acid for the destruction of weeds in wheat has become very widespread in Lot-et-Garonne. The spraying with acidulated water is done between February 1st and March 15th, when the wheat has five or six leaves. Experience soon shows what strength to use. With 5 parts of acid at 60 or 66° Baumé in 100 parts of water, two or three out of the six leaves on the wheat are immune; the runch plants are scorched, but the vetch („vesces") and vetchling („gesses") may escape. With 10 parts of sulphuric acid per 100 parts of water, all the leaves of the wheat are scorched but the stalk escapes, and the plant picks up in eight or ten days. With this streangth wild oats, dogs-tooth grass (*Cynodon Dactylon*) and cardoon grow again. With eight parts of acid the result is much the same, and this is the strength most frequently employed.

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(1) The runch, or wild radish (*Raphanus Raphanistrum* L.) is one of the Cruciferae. It is a weed on sandy, loamy and humous soils in France. Cf. D. ZOLLA, *Dictionnaire d'Agriculture*, p. 658, Paris 1904).

It is as well, however, to make some preliminary experiments on small plots. Sulphuric acid has a powerful effect on all the soil constituents, with the result of increased fertility. The acid solution attacks the spraying apparatus, if made of copper; lead-covered sheetiron should be used.

It is estimated that 10 hectolitres of liquid per hectare (90 galls. per acre) are necessary, that is, at 8 %, 80 litres (about 7 galls.) of sulphuric acid; at 60 or 66° B., this is equal to 130 to 140 kg. (about 300 lbs.) of acid. The cost price at 11 or 12 fr. the 100 kg,, is from 15 to 17 fr. If manual labour be taken into consideration, the total cost per hectare would be from 35 to 40 fr.

The Destruction of Stinging Nettles. *The Journal of the Board of Agriculture*, vol. XVII, N. 72, pp. 986-988, London, March 1911. **1305**

Great Britain
Germany

The large stinging nettle (*Urtica dioica*) and the small stinging nettle (*U.urens*) are equally injurious in field and garden.

The best way of controlling *Urtica dioica* in arable land is to pull it up and burn it, and afterwards to plough deep and hoe frequently.

In meadows, the nettles may be pulled up by hand and burnt, if they are only to be found on very small areas. They may also be covered with large sheets of tarred paper, which should be pegged into the ground and kept down with heavy stones; on the spots which are thus deprived of light, vegetation is destroyed. The places treated in these two ways must all be resown.

In the case of large or small areas, nettles may be killed by regularly cutting the shoots as soon as they appear in spring. This is done when the new shoots are from 6 to 12 ins. in height.

The extermination of the weed may be hastened by the use of a solution of salt (5 ½ lbs. per rod, or for larger areas 6 cwt. per acre) after the cutting of the shoots in spring.

Some experiments made in Germany in 1909 with the object of destroying stinging nettles on large areas showed that the young shoots are destroyed in spring by a spraying with a 15% solution of Kainit (it is very probable that the action of Kainit is chiefly due to the common salt which it contains).

The small nettle (*Urtica urens*) is successfully controlled, wherever it appears in arable land, by thorough and regular weedings, which prevent it from being reproduced for one or two years.

1306 **Destruction of Thistles**. (Field Expts. in Staffs and Salop and at Harper Adams Agric. Coll.; Joint Rept. 1909). *The Journal of the Board of Agriculture*, London, March, 1911, p. 1019.

Great Britain In 1996 and 1908 some dressings of salt and copper sulphate were found to have little effect on thistles (*Cnicus* spp.), and this treatment was therefore given up in 1909, and the plants cut. By checking the growth of the thistles above ground in the early summer, the development of the underground stem is hindered and the plant is not able to spread so freely. The second growth is not so strong, and the seed-producing stems are less luxuriant. Second cutting, in July, weakens the plant, the growth of which is further checked by the third cutting.

If the same treatment is carried out in the second year, very few thistles are left and at the end of the third year there are practically none.

Insects and Other Injurious Invertebrates Their Biology and Control.

1307 FRED. V. THEOBALD. **Report on Economic Zoology for the Year Ending April 1st, 1909.** — *The Journal of the South-Eastern Agricultural College*, Wye Kent, No. 18, pp. 443 (108-195. London and Ashford, Kent, 1909.

ANIMALS INJURIOUS TO FRUIT TREES AND BUSHES.

Great Britain: England

The Raspberry Weevil (*Otiorhynchus picipes*) has been observed on cherry trees at Oakhampton, Stourport. The parasite is well known in this locality, where it is called the Cherry Bug. It damages the buds, foliage and fruit.

This insect also attacks pear grafts in Kent, the bark being some times completely stripped off.

The Raspberry Beetle (*Byturus tomentosus*) attacks the Loganberry (1). It causes great damage in Kent and Worcestershire, and to some extent in Somersetshire. It is well known that this insect cuts off the flowers of raspberries; but it is a worse foe to the loganberry, it eats passages around the perianth and the stamens of the open flower, and thus the blossom is killed. Sprayings with arsenical washes are useless. This insect also devours the flowers of the apple tree.

The Apple Blossom Weevil (*Anthonomus pomorum* Linn.) was again very plentiful in Worcestershire, Cambridgeshire and Kent. The life-history of this insect is well known, but no effective method for its control has been found.

Leaf Weevils (*Phyllobius* spp.) on Fruit Trees. Different species of *Phyllobius* sometimes cause serious damage to the fruit trees, destroying the buds and flowers and devouring the leaves. On the other hand, these insects are sometimes found in large numbers on a tree without doing any apparent harm. These beetles may be caught on grease bands, as, hatching from the ground, they first crawl up the tree-trunks.

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(1) The Loganberry is a remarkable hybrid reproduced at Santa Cruz, California, by the accidental crossing of the Aughinbaugh blackberry with the Old Antwerp raspberry. Cf. BAILEY, *Cyclopedia of Am. Hortic.* (*Ed.*).

The Apple Sawfly (*Hoplocampa testudinea* Klug) persists in districts where it has previously been reported. Quite young fruit showed the perforations, mealy sinuous tunnelling, and brown discoloration due to the larvae.

The Slugworm (*Eriocampa limacina* De Geer) was observed on pear and cherry trees. Generally speaking, it appears late in the year, and consequently does but little damage; but sometimes it occurs in large numbers in August, and then, by destroying the foliage, it prevents the wood from ripening sufficiently. Spraying with arsenate or hellebore, or dusting with lime by means of a sulphurator will soon destroy them.

The Plum Sawfly (*Hoplocampa fulvicornis* Klug) has undoubtedly increased very much during the last three years. It is probable that it is indigenous in several districts, since it is to be found even in wild plums. From this source an orchard may soon become invaded. Drastic measures are therefore necessary. All the fruit which is affected, should at once be destroyed and the ground dressed with " Vaporite ".

Wood Leopard Moth (*Zeuzera pyrina* Linn.). The larvae of this moth were found at Mereworth tunnelling into apple-trees; in Norfolk it attacked cherry trees, and in Huntingdon, pear trees. This insect is never abundant, but a few do so much harm that they are readily noticed. The branches attacked should be cut right back and the larvae found in them destroyed.

The Garden Swift (*Hepialus lupulinus* Linn.). The larvae of the above were unusually abundant in the winter of 1908. In Kent and Worcester they attacked, not only the roots of strawberries, but of all kinds of garden plants. Mint is one of their favourite foods. When these caterpillars attack the strawberry-plants they devour the fibrous roots, and tunnel into the rhizomes, thus killing the plant.

A parasite of the *Hepialus*, *Cordiceps entomorrhyza*, was observed in two cases.

The Vapourer Moth (*Orgyia antiqua* Linn.). The ova of this moth were sent for identification from Chart Sutton, Taunton, Sevenoaks, Northampton and Exeter. The insect is found on fruit trees, but is often very harmful to rose trees. It occurs occasionally on hops, and in 1908 it even attacked peach trees. It was introduced into the United States with some rose trees imported from France. It does not cause much damage to fruit trees in Great Britain.

The Magpie Moth (*Abraxas grossulariata* Linn.). This is very general over Great Britain, but it does not cause much damage as a rule.

The Green Pug Moth (*Chloroclystis rectangulata* Linn.) was observed at Longfield, Sevenoaks, Worcester and near Exeter. The larvae eat into the buds and flowers of apple and pear trees, devour the tender tips of shoots and foliage and spin the trusses of blossom together. An early spraying of arsenate of lead or of nicotine wash will rapidly destroy these caterpillars.

Tortrix larvae (*T. ribeana* and *T. pruniana*). These were observed on apple and plum trees.

The Vine Tortrix (*Tortrix reliquana* Hb.). The larvae were found under the bark of an indoor vine in December, which shows that this insect hibernates in the larval state.

Plum Fruit Moth (*Opadia funebrana* Fr.). During the summer of 1908, serious damage was caused by this insect in certain parts of Great Britain, and also it seems, on the Continent. In Germany a very useful paper banding was used which is also efficacious for trapping *Carpocapsa pomonella*, etc. The paper is double, the under half being deeper than the upper, and between is placed a layer of fluted paper; the larvae creep up into the latter and hibernate there. The bands should be removed and burnt in April.

Cherry Tree Borer (*Semasia Woeberiana* Schiff). This pest is still reported from the Sittingbourne area of Kent and has now been traced to beyond Maidstone.

Raspberry Shoot Borer (*Lampronia rubiella* Bjerk). This is the cause of serious damage in Somersetshire. Smearing the canes with soft soap at the beginning of March catches the larvae and seems the best plan for checking the pest.

Pith Moths (*Blastodacna hellerella*, etc.). This appeared in several localities in 1908. The method already recommended, which consists of pruning the blistered shoots where the larvae winter, has been found efficacious.

The Pear Midge. (*Diplosis pyrivora* Riley). Appeared at Rodmersham, Bourne near Faversham, and again at Reigate and Hereford.

Cecidomyia Larvae in mummy plums. Some mummified Czar plums were examined, which contained small red larvae, these proved to be larval *Cecidomyidae* belonging to a group which has, as yet, not been worked out or named. It is known that these larvae feed on fungi; especially mildews and moulds, but from their small size, they are very little good.

Black Flies (*Bibionidae*). There are several common species, the most common being perhaps *Bibio hortulanus*; they do little harm themselves, but their larvae destroy the roots of strawberries, hops and most garden plants.

Leater Jackets (larvae of *Tipula oleracea*) in Loganberries. These new pests to a valuable fruit are likely to be of occasional occurrence and the soil should be cleared of them before planting. « Vaporite » and « Fumite » are valuable remedies.

Apple Sucker (*Psylla Mali* Schmid). In Worcestershire and Kent good results have been obtained with washings of lime and salt.

The Currant Root Louse (*Schizoneura Ulmi* or *S. fodiens*) has been observed at Longfield. As Barsacq's studies have shown, Buckton's *Schizoneura fodiens* is only an alternate generation of *Schizoneura Ulmi*.

The Green Fly (*Aphis Grossulariae* Kaltenbach) of the gooseberry and currant probably occurs widely over the country. It has been confused with *Rhopalosiphum Ribis*, but is quite distinct from it. It causes the top skoots to become dwarfed and the leaves to curl up.

Wooly Aphis (1). Fumigations with hydrocyanic acid are very efficacious for the control of this insect.

Mussel Scale (2). Good results have always been obtained in Kent and Worcester in the control of Mytilaspis with Woburn Winter wash of paraffin and caustic soda.

The Nut Bud Mite (*Eriophyes Avellanae* Nalepa) was observed in several localities. It is generally believed that it is the same as the Big Bud Mite of the currant, but it is quite a distinct species, for several attempts to infect currants with it have been unsuccessful.

Plum Leaf Blister Mite (*Eriophyes phloeocoptes* Nalepa). Observed in Kent.

Pear Leaf Blister Mite (*Eriophyes Piri* Scheut). This appeared in large numbers in different localities in 1908. The treatment which keeps it most in check is that of winter sprayings with lime, salt, caustic soda or sulphur, followed by an early spring dressing of paraffin emulsion and this may also be used in the autumn, after the fruit has been gathered.

MAMMALS.

Damage to Fruit Trees by Voles (3). Both the Bank Vole (*Erotomys glareolus*) and the Field Vole (*Microtus agrestis*) weill attack the bark of fruit trees above ground but the damage done below the surface is due to the Field Vole. This rodent is common in England, Wales and Scotland (with the exception of Lewis), but is unknown in Ireland. It is the most injurious species to the farmer and forester, and it may prove so to the horticulturist and fruit-grower. Vole plagues have been numerous in Great Britain; such as those of 1580, 1813-14, 1874 to 1876. Destruction on a large scale is very difficult. Excellent results have been obtained with Virus, but sometimes it proved useless; injection of carbon disulphide into their tunnels is efficacious, but expensive.

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(1) *Schizoneura lanigera* (Board of Agriculture Leaflet, 37). (*Ed.*).

(2) *Mytilaspis pomorum* Bouché (Board of Agriculture, Leaflet 107). [*Ed.*]

(3) Short-Tailed Field Vole = *Microtus agrestis* (formerly called *Arvicola agrestis*); Water vole or water rat = *Microtus amphibius;* Bank vole = *Erotomys glareolus*, Cf. *Voles and their Enemies*, Board of Agriculture, Leaflet 6.

GENERAL.

Grease banding of Fruit Trees (1). Nicotine experiments. The proportions of nicotine used were: *a*) 1 $^1/_5$ oz of 98 % nicotine; *b*) 1 oz of 98 % nicotine and *c*) ½ oz of 98 % nicotine per 10 gallons of water both plain, and a similar series vith ½ lb. soft soap in addition.

The test was applied in the open, upon the larvae of the winter moth (*Cheimatobia brumata*) and of the Gooseberry Sawfly (*Nematus Ribesii*) adult Rose-grubs (*Tortrix* sp.); Ivy Red Spider (*Bryobia pretiosa*); *Psylla Mali*; Apple Aphides (*Aphis Pomi*); Plum Aphides (*Aphis Pruni*); Currant Aphides (*Rhopalosiphum Ribis*); Turnip Flea (*Haltica nemorum*); Mussel-Scale (*Mytilaspis pomorum*); *Thrips* sp. and Cuckoo-spit. In every case the nicotine was much more efficacious when mixed with soft soap. The general results showed that for certain adult insects, such as the *Psylla*, *Thrips*, Cuckoo-Spit (*Euacanthus interruptus*) and the young larvae, the nicotine is fatal, as it is also for certain Aphides. Its effect on mature caterpillars is very doubtful and on Flea-Beetles (*Halticae*) and Celery-Fly it proved quite useless.

ANIMALS INJURIOUS TO CORN CROPS.

"*Tulip Root*" in Oats and other eel-worm attacks. The condition which is called "*Tulip Root*" or "*Segging*" of the oat plant is entirely due to *Tylenchus devastatrix* Kuhn. This pest has caused serious damage in Devon, Dorset, Somerset, Wiltshire, Herefordshire,

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(1) The general results of these experiments are published in the *Journal of the Board of Agriculture*, Vol. XVII, N. 7, p. 542. See also, p. 173 of the *Bulletin* of Nov. 1910. (*Ed.*)

Middlesex, Kent, Surrey, Hampshire, Sussex, Suffolk, Yorkshire and Monmouthshire. In certain cases the "*Tulip Root*" was accompanied by an attack of *Oscinis frit.* The appearance of attacked oats is very marked. The whole plant is stunted, the leaves assume an unhealthy appearance, and the edges of the blades become crinkled and wavy. The lower parts of the stems swell above ground and assume a bulb-like appearance. Later, the plants turn brown and die.

In addition to oats, *Tylenchus devastatrix* also destroys wheat, rye, onions, potatoes, clover, buckwheat, hyacinths and other bulbs, as well as many wild plants: grasses, teazles and *Polygonum.* It is also found on the roots of hops and of plants in pots, as well as on the stalks of the wallflower (*Cheiranthus Cheiri*).

Tylenchus devastatrix as a potato parasite, is well known in South Africa, Tasmania, New Zealand, etc.; it has been found near London and in Kent.

Heterodera Schachtii on wheat. *Heterodera Schachtii* is well known on wheat on the Continent; two more cases have been reported from England since the one mentioned in the previous year's report.

ANIMALS INJURIOUS TO GRASS LANDS.

Heather Beetle (*Lochmaea suturalis* Thoms.). Observed in the peninsula of Wirral.

Chafer Larvae (*Melolonthidae*). The larvae of *Rhizotrogus solstitialis* are very plentiful in the south of England. The Garden Chafer *Phyllopertha horticola* is common in Wales.

ANIMALS INJURIOUS TO ROOT CROPS.

The *Mangold Fly* (*Pegomyia Betae* Curtis). The flies deposit their eggs on the leaves of mangolds and beets. The first generation causes very little damage, but the later ones are very injurious, devouring the leaves. The larvae which tunnel into the cotyledons do not survive, while those which attack the first young leaves mature. It is generally stated that there are two generations in the year; but in 1908 there were three.

ANIMALS INJURIOUS TO PULSE.

Bean Beetles (*Bruchus rufimanus* and *B. flavimanus*). The *Bruchidae* rarely do any damage in England, because infected seed is, as a rule, not sent ont. There was, however, one exception at Greenhithe.

ANIMALS INJURIOUS TO HOPS.

Fever Flies (*Bibionidae*). Considerable injury has been caused in several localities by the larvae of *Bibio hortulanus* and *Bibio marci.*

The hops were also damaged by *Diplosis humuli, Ptinus fur* and *Tylenchus devastatrix.*

ANIMALS INJURIOUS TO VEGETABLES.

The *Large Cabbage White Butterfly* (*Pieris Brassicae* Linn.). In 1908 the larvae did considerable damage in parts of East Anglia and elsewhere.

These caterpillars are much preyed upon by parasites of which one of the chief is *Microgaster glomeratus* Linn; others are: *Pimpla instigator* Fab., *Pteromatus Brassicae* Curtis, *P. partiae* Linn. and *Polynema gracilis* Nees.

Some *Bibio* larvae were observed on rhubarb at Hereford: *Celery Fly* (*Acidia Heraclei* Linn.) at Orpington; *Celery Stem Fly-* (*Piophila Apii* Westwood) at Westerham and Ely; *Cabbage Root Maggot* (*Phorbia Brassicae* Bouché) at Newark, and in Cornwall, Suffolk and Kent.

Asparagus Beetle (*Crioceris Asparagi* Linn.). It is generally considered in England that this insect does but little damage to the asparagus, since it only attacks the leaves, but in North America it is a much more serious enemy, because it devours the young shoots as soon as they appear above the ground.

Aphis Carotae has done damage to carrots at Chelmsford and Wye.

MUSHROOM FOES: *Aphodius fimetarius* and a *Podurid:*

ANIMAL PESTS OF FLOWERS.

The larvae of *Otiorhynchus picipes* destroyed the *Echevinas;* rose trees were attacked by *Blennocampa pusilla* Klug., which curls up the leaves, by *Emphytus cinctus,* which damages the leaves and buds, and by ants (*Formicidae*), which latter were very numerous in 1908.

Several experiments were made with various substances and the following were found to be the most efficacious against ants: injections of disulphide of carbon, waste acetylene refuse, boiling water, and "Vaporite".

Rose trees were also attacked by *Otiorhynchus picipes* and *Typhlocyba Rosae* Linn. Eel worms were found attacking pot-plants and fern-fronds.

ANIMAL PESTS OF FOREST TREES.

Considerable havoc was caused by: *Cryptorhynchus lapathi* Linn., *Chermes Pini* Kalt., and *Cryptococcus Fagi* Barens.

ANIMALS WHICH ARE INJURIOUS TO MAN.

A complete list is given of the British *Culicidae*, as that included in Verral's list of British Diptera is now out of date.

1308 O. GEMMERIG. **Do Bees Injure Grapes?** (Ist die Biene ein Schädling des Weinbaues?) — *Deutsche Landwirtschaftliche Presse*, N. 19, S. 219, Berlin, 8. März 1911.

Germany

It is sometimes stated that bees do damage to grapes.

The following conclusions have been arrived at by a German farmer who has made observations on bees for several years:

1) Bees never attack uninjured grapes, but suck the juice from those already damaged by wasps or other creatures.

2) When a bee finds a damaged grape it sucks away all the juice, thus preventing its spoiling the sound fruit.

3) The presence of bees near a vineyard keeps away wasps.

1309 **Insect and Fungoid Pests.** — *Nature*. No. 2 161, vol. 86, pp. 161-162. London, March 30th., 1911.

United States South Africa

A recent bulletin by Mr. H. E. Burke states that the flat-headed borers (*Agrilus*) cause damage amongst forest trees to the extent of 100 000 000 dollars yearly in the United States alone. Methods of treatment are now known and much of the damage can be prevented.

The San José scale (*Aspidiotus perniciosus*) may be destroyed, according to L. A. Quintance, with petroleum or kerosene washes or with lime and sulphur washes.

« Brown rot » (*Sclerotinia fructigena*) and Plum curculio (*Conotrachelus nenuphar*) are very injurious to peaches and plums respectively, but can be kept in check by a lime-sulphur wash containing lead arsenate.

The clover-root curculio (*Sitones hispidulus*), is not a common pest. It is destroyed by a number of birds, and in the larval stage is attacked by a fungus.

The common Colorado ant (*Formica cinereorufibarbis*), protects the aphis of the melon. It is said that it is not an uncommon sight to see the ants hard at work killing and carrying away the larvae of the Syrphides which destroy the aphides. Some adult Lady-birds *Hippodamia convergens*, the nabid bug, *Reduviolus ferus* and a species of Chrysopa, were also carried away by the ants. The most simple method of extermination seems to be watering the nests with a weak solution of cyanide of potassium.

In a recent number of the « Agricultural Journal of the Cape of Good Hope », Messrs. Law and Manning discuss the extermination of ticks on the veld.

Of the three methods used: periodical dipping and spraying of the hosts, grass burning, and isolating the affected areas for a period long enough to cause the ticks to die through the absence of their hosts, dipping or spraying seems to be the best, but the other two are also effective.

Another article describes the ostrich wire-worm (*Strongylus Douglasii*), a worm which is found in the proventriculus of the ostrich; the treatment usually adopted is that of giving the bird a strong dose of carbolic acid, insufficient of course to kill it. The treatment is not satisfactory, however, and others are discussed, but none can be depended on as certain.

G. LÜSTNER. ***Solenobia triquetrella* Zell in Germany, an Insect Resembling the Vine Cochylis.** (Ein Doppelgänger des Heu- und Sauerwurms, der dreieckige Sackträger, *Solenobia triquetrella* Zell.) *Weinbau und Weinhandel*, 29 Jahrg., N. 16, S. 187-188, Mainz, 22 April, 1911. **1310**

Germany

During this winter, in many parts of Germany, an insect was seen which resembled Cochylis so much as to be easily mistaken for it. This was *Solenobia triquetrella* Zell., called in Germany « dreieckige Sackträger », on account of the triangular form of its cocoon.

It is not possible to affirm yet whether this insect should be counted amongst vine pests. According to Mr. Lüstner, it is not very likely to be harmful, as *Solenobia* feeds on dead animal and vegetable substances.

1811 **List of Plants Attacked by *Diaspis pentagona*.** (Elenco di Comuni ai quali fu imposta la cura dei gelsi infetti dalla *Diaspis pentagona*, fino al 31 dicembre 1910). — *Bollettino del Ministero di Agricoltura, Industria e Commercio,* anno X, vol. II, serie B, fasc. 10, pp. 297-310. Roma, 11 Marzo 1911.

Italy

The following plants which have been recognised as subject to infection by *Diaspis pentagona* have been added to the list made by those Communes of Italy, which have been intrusted by the Ministry of Agriculture with the care of mulberry trees affected by that disease:

Nettle-tree (*Celtis australis* L.).
Berberis stenophylla Hance.
Caryopteris Mastacanthus Schau.
Catalpa (*Bignonia Catalpa* L.).
Newjersey Tea (*Ceanothus americanus* L.).
Bittersweet-Nightshade (*Solanum Dulcamara* L.).
Runner beans and their varieties (*Phaseolus vulgaris*).
Ash (*Fraxinus excelsior* L.).
Spindle tree (*Evonymus europaeus* L.).
Mulberry and its varieties (*Morus alba* L., *M. nigra* L.).
Paper-Mulberry (*Broussonetia papyrifera* Went.).
Jasmine (*Jasminum officinale* L.).
Kentucky Coffee (*Gymnocladus dioica* C. Koch).
Gleditschia ferox Desf. and Honey Locust tree (*G. triacanthos* L.).
Horse Chestnut (*Aesculus Hippocastanum* L.).
Kerria japonica D. C.
Cherry laurel of Trebizond (*Prunus Laurocerasus* L.).
Hop (*Humulus Lupulus* L.).
Almond (*Amygdalus communis* L.).
Mahonia (*Berberis Aquifolium* Pursch.).
Walnut (*Juglans regia* L.).
Nettle (*Urtica dioica* L.).
Paulownia imperialis L.
Pelargonium sp.
Peach and its varieties (*Amygdalus Persica* L.).
Lombardy or Italian poplar (*Populus pyramidalis* Salisb. = *P. italica* Duroi).
Pueraria (*Pachyrhizus*) *Thumbergiana* Benth.
Red currant and its varieties (*Ribes rubrum* L.).
Willow (*Salix* sp.).
Common sage (*Salvia officinalis* L.).
Choisya ternata H. B. and K.

Lilac (*Syringa vulgaris* L.).
Sophora japonica L.
Spiraea japonica L. = *S. Fortunei* Planch.
Trachelospermum (*Rhyncospermum*) *jasminoides* Lem.
Ribes Uva-crispa L.
Virginian Creeper (*Ampelopsis quinquefolia* Michx.).
Vine (*Vitis vinifera* L.).
Cucurbita sp.

L. MARTELLI. **The new Coccus of Citrus Fruits, *Chrysomphalus dictyospermi* var. *pinnulifera* Mask. and its natural Enemies.** (La nuova Cocciniglia degli Agrumi, *Chrysomphalus dictyospermi* var. *pinnulifera* Mask. (volg. « bianca rossa »), — *Conferenza tenuta al Comizio Agrario Circondariale in Acireale il* 15 *gennaio* 1911, pp. 1-13. **1812**

Italy: Sicily

Chrysomphalus dictyospermi var. *pinnulifera* Mask. (1), is a scale which does much harm to the citrus fruits in Sicily, where it was recently introduced and is known under the name of « bianca rossa ». Mr. Martelli states, amongst other things, that some experiments are being made to find a natural method of controlling this insect.

Hithertho, only one possible parasite has been seen hovering around the citrus fruit plantations infected by the *Chrysomphalus*. It appears be a species of *Aphelinus*.

To this insect must be added two native Coleoptera, *Chilocorus bipustulatus* and *Exochomus 4-pustulatus*. But as these are indigenous and have parasites in their turn, their utility in the control of the Chrysomphalus is limited.

In consequence the Royal Station of Acireale for the Cultivation of Cirrus and other fruits introduced a new Coccida, *Rhizobius lophantae*, in March-April, 1910; it appears already to have become acclimatised.

This parasite, which is very active against *Diaspis pentagona*, is native to Australia, whence it has come to us by South Africa (Cape of Good Hope). It is an ardent hunter of other diaspides, and consenquently of *Chrysomphalus*.

In addition to the *Rhizobius*, the Royal Station will introduce other parasites of Chrysomphalus from the tropica regions of Asia.

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(1) Seen No 688 in the February *Bulletin*, 1911.

Mention is made of the probable introduction into Sicily of another scale which is fatal to the citrus fruits, *Aonidiella Aurantii* Mask., which has already made its appearance in Italy, where the introduction is feared of *Aspidiotus perniciosus* Comst., which has done so murch harm in America to fruit trees.

At the conclusion of the article the various plants which the *Chrysomphalus* attacks are enumerated. They are the following:

Evonymus japonicus, Hedera, Camellia japonica, Deutzia crenata, Ficus Carica, Cocos australis, Crataegus glabra, Ligustrum vulgare, Gardenia grandiflora, Kentia Belmoreana, Cycas revoluta, Chamaedorea elatior, Latania borbonica, Araucaria sp., Myrtus communis, Aucuba japonica, Magnolia sp., Rose trees, etc.

1813 **Bohemia** R. Sarcin. **Mechanical Determination of the Resistance of Cereals to the Attacks of Insects.** (Détermination mécanique de la résistence des céréales aux maladies et aux attaques des insectes). See no. 1284 of this Bulletin.

1814 **Insecticide Competition at Valencia.** (Concours d'insecticides à Valence). — *La Petite Revue Agricole et Horticole,* 17e année, N. 392, p. 78, Antibes, 9 Avril, 1911.

Spain An international competition for insecticides is to be held in the province of Valencia (Spain) for the control of *Chrysomphalus dictyospermi*, *Mytilaspis flavescens*, *Parlatoria Ziziphi* and *Dactylopius Citri*, parasites which attack the orange and lemon trees.

Hydrocyanic acid is not included in the insecticides which are to be tried, because a Special Commission is at present making experiments in fumigations with this gas in various provinces and especially in Valencia.

1815 Ch. Bernard. **Observations On the Tea Plant in Java.** — *Bull. Dept. Agr. Indes néerlandaises,* N. 60, 1910. *La Quinzaine Coloniale,* 15e année, N. 5, pp. 162-163, Paris, 10 Mars, 1911.

Java In consequence of some experiments made at Buitenzorg in the course of 1910, it has been found that it is better to burn the twigs of the tea plant after pruning than to bury them at the foot of the bushes. Acari, and especially the orange Acarus (*Brevipalpus obovatus*), are not killed by burying and reinfect the plantations.

Treatment on a large scale with insecticides does not seem possible, and the only thing which has given favourable results has been the improvement of the cultivation conditions, so that the plant is itself in a better condition for resisting attack.

A certain number of Acari affect the tea plant also indirectly, such as the *Phytoptus*, which causes galls on the leaves of *Indigofera galegoides*, a leguminous plant much used for green manure.

1816

J. CAPUS and J. FEYTAUD. **The Invasions of Eudemis and Cochylis in the Gironde in 1910. Studies on the Use of Insecticides.** (Les invasions d'Eudémis et de Cochylis dans le Gironde en 1910. Recherches sur les traitements insecticides). — *Revue de Viticulture*, Paris, 27 Avril, 1911.

France: Gironde

The experiments of 1910, confirm those previously made by the writers in so far as the determination of the favourable moment for the application of insecticides in spring and summer is concerned. This has been found to be when the eggs are laid, and precedes the invasion by several days. In years when the generations are hatched at especially long intervals, as in 1910, it is still possible to destroy a given generation with a single treatment, but under these conditions, the determination of the opportune moment is more difficult than in those years when the hatching of all the moths takes place within a brief period.

The repetition of a treatment after some days, which is useless as far as Eudemis is concerned, may sometimes be successful in the case of Cochylis, on account of the eggs being hatched at longer intervals.

Arsenic is not necessary; nicotine in a cupric mixture is a most efficacious remedy againsts both pests. Chloride of barium may be substituted for the nicotine, and added to sulphate of copper mixtures.

Soap, which has been so much recommended by German experimenters, cannot replace nicotine, nor can it even increase its effect in preventive applications. The stripping of the leaves assists the summer treatments, and increases their efficacy.

Messrs. Capus and Feytaud recommend the *application of a nicotine cupric mixture.*

a) *Formula:* to one hectolitre of neutral or basic Bordeaux Mixture with 2 % of copper sulphate, add 133 gr. of pure nicotine, that is, 1 ⅓ litre of tobacco juice at 10 %.

b) *Number of treatments:* two yearly, or one against the first and one against the second generation, under ordinary conditions. When the appearances of the moths occur at long intervals owing to the year or the climate, it will sometimes be advantageous to repeat each of these treatments.

c) *Time*: the moment when the moths are most plentiful. (Generally at the end of May and June in the Gironde).

d) *Apparatus*: a knap-sack sprayer which leaves free the hand that is not holding the tube. For the exclusive treatment of the bunches a stop-jet is preferable.

e) *Preliminary precautions*: expose the bunches, if necessary, by thinning the leaves or shoots.

f) *Spraying*: examine the bunches well and spray then thoroughly. Pass along both sides of the row, so that none shall be overlooked.

1817 R. W. Jack. **Resin Wash for Scale Insects on Citrus trees.** *The Rhodesia Agricultural Journal*, pp. 416-422 Salisbury, February, 1911.

Rhodesia The use of resin wash as a remedy for scale insects on citrus trees has already passed the experimental stage and is being adopted in ordinary practice by the planters in California.

The formula used is as follows:

Resin 18 lbs (8.15 kg.)
Caustic soda (70%) 5 lbs (2,26 kg.)
Fish oil 2 ½ pints (1.16 litre)
Water 100 gallons (454 litres).

Modified formula, omitting the fish oil:

Resin 40 lbs (18.12 kg.)
Caustic soda (70%) 5 lbs (2,26 kg).
Water 100 gallons (454 litres)

These formulae, which have been recommended in the United States as the best, have been tried in South Africa.

It has been found that no useful modifications can be made in the Californian formula, and that is it really efficacious if care is taken to apply the mixture hot.

The formula without the fish oil was found efficacious, when applied hot, against soft scales; but it was less effective than that with the fish oil (weight of resin being equal) for red and other hard scales

The standard formula recommended for use in Cape Colony is as follows:

Resin 24 lbs (10.87 kg.);
Caustic soda (98 %) 5 lbs (2.26 kg.);
Fish oil 2 bottles (1,50 litre);
Water 100 gallons (454 litres);

This mixture is prepared as follows:

First crush the resin, then pour 15 gallons or more of water into the cooking pot, stir in the soda and oil, and bring to the boil.

Then gradually stir in the powdered resin never letting any settle,and boil for 10 or 15 minutes after it is all dissolved; the solution should be the colour of strong coffee.

Less than three quarters of an hour is sufficient for this preparation provided that the resin is well crushed and is not allowed to settle; if it gets into a mass, the operation may take 3 hours. Some more water, either hot or cold, should then be added very gradually if the mixture foams up strongly, and when the whole has boiled sufficiently, the quantity of water should be at once increased to 25 gallons.

This mixture may be preserved indefinitely, but care should be taken to prevent a deposit; if this should occur, it must be boiled again. The hot or cold water can be added at any moment,

Insects Injurious to Special Crops.

MAGEN. **An Insect Pest of Rice in Cochin China.** (*Bull. écon. de l'Indochine*, n. 82). *La Quinzaine Coloniale*, 15e année, n. 5, p. 163, Paris, 10 Mars, 1911. **1318**

French Indo China: Cochin China

A Hemipteron (of the group of the Geocorinae) is causing considerable damage to the rice in Cochin China.

The rice which has been attacked is easily recognised by its yellow colour and the fact that the leaves lose their turgescence. During the growing period, the insects crowd together at the base of the stalk, at the etiolated part. Between the stems, groups of about 50 eggs are found forming hexagonal plates 5 mm. in diameter.

The adult, in the normal condition, inhabits the forest, but towards the month of September the female seeks for a favourable place to lay her eggs, and descends upon the rice fields.

For the protection of the latter in the western provinces of Cochin China, where there are forests, it is absolutely necessary that the rice fields should be sloped in such a way as to keep the height of the water at about 20 cm, above the crown of the plants. The plants must be irrigated in proportion as they grow, so that it is impossible for the female insect to lay her eggs upon them.

1319 D. T. Fullaway. **Insects attacking the Sweet Potato at Hawaii.** — *Hawaii Agric. Exper. Station Bulletin*, No. 22, 8⁰, pp. 31. Honolulu, 1911.

Hawaii Although the sweet potato is not cultivated on large areas at Hawaii, the total crop is large and is very commonly used as an article of food. A list is given of the insects which attack it and a description of their life-cycle, habits, natural enemies, means of control, etc.

Elateridae. Out of 35 or more species of indigenous or introduced cutworms and army worms (Elateridae) only 8 are common at Hawaii and damage the crops. These are: *Cirphis unipuncta, Agrotis ypsilon, A. crinigera, Feltia dislocata, Lycophotia margaritosa, Spodoptera mauritia, S. exigua, Caradrina reclusa.* The others are more or less confined to the mountains and kept in check by pararites.

The invasions of Elateridae occur more frequently in the cold, damp winter months than at any other period of the year.

Their natural enemies are numerous and fairly efficient. The Tachinids, *Frontina archippivora* and *Chaetogaedia monticola, Ichneumon Koebeli,* and birds are particularly useful.

The Sweet Potato Sphinx. The larvae of the Sphinx moth (*Protoparce Convolvuli*) feeds on the various species of Ipomaea. It is said that it attacks the sweet potato in the United States, th West Indies, the Madeira and Canary Islands, Australia and Ind In Hawaii it often destroys the wild Ipomaea, completely stripping it of its leaves, and sometimes attacks the sweet potatoes. The species is kept in check by a Hymenopteron, *Pentarthron semifuscatum* Perkin, which acts as a parasite on the eggs. Dr, Perkins mentions that the larvae are also destroyed at their earliest stage by parasites probably *Echthromorpha* and Tachnid flies.

The *Leaf Miners.* The genus Bedellia (Tineidae) is represented at Hawaii by 7 species, the larvae of which are leaf miners. *Bedellia somnulentella* and *B. minor* mine the leaves of Ipomaea, *B, oplismeniella* those of a grass *Oplismenus compositus*, and *B. boehmeriella* attacks the leaves of *Boehmeria stipularis.* The leaf miner which usually attacks the potato in the environs of Honolulu is, according to Bask, *B. Orchilella* which is not known outside the Hawaiian Islands. *B. minor* is found in Florida and Hawaii. B. sommulentella has a wide distribution. The leaf miners are kept well in check by the Chalcid *Omphale metallicus*, which is a parasite of the larvae, and by another Eulophid (*Pediobius*).

The Sweet Potato Stem Borer (*Omphisa anastomosalis*) is not a native insect, but was probably introduced recently from China.

It is indigenous to the Indo-Malay region. It was observed for the first time at Hawaii in 1900, since when it has been continually on the increase, and promises to become a serious scourge if not kept in check by its natural enemies. The damage is caused by the larva or caterpillar, which bores through the stems of the plants, these fade, and finally die. An Ichneumon fly *Pristomerus* sp. has been bred from the larva, but it is not known to what extent it is a parasite.

The Sweet Potato Leaf Roller (*Phlyctaenia despecta*) was only recently observed on this plant, although it is common in the mountains, on the wild species of the genus Ipomaea. It is an indigenous insect. The larvae of P. despecta roll up the leaves, living on the under surface. The moth is sometimes very injurious to *Batatas edulis*, but is generally kept in check by parasites. Mr. Fullaway has bred *Limnerium Blackburni*, a parasite of the larvae, and Dr. Perkins has bred *Chelonus Blackburni* and *Chalcis obscurata*. A common wasp of the genus *Odynerus* (*O. nigripenus*) has been seen collecting the caterpillars.

The Tortricid Leaf Roller (*Amorbia emigratella*), which contorts and rolls the leaves, is not an indigenous insect, but was introduced into Hawaii, where it has been known since 1900. It is also found in Mexico and at Porto Rico, and was probably brought to Hawaii om those countries. It has developed very rapidly, and the large nber of food plants that it attacks makes it a serious pest. larvae roll the leaves of many species of plants and are often so numerous as to defoliate trees.

This insect has been found on the citrus trees, cotton plant, avocado, guava tree, rose tree, passion flower, tomato, papaya tree, cacao tree, as well as on the sweet potato and various indigenous plants in the mountains. It has *Chalcis obscurata* for parasite.

Unfortunately the egg parasite *Trichogramma* sp., which contributes more than anything else to keep this class of pest in check, is incapable of penetrating the thick covering of the eggs of the *Amorbia*.

Weevils. There are two weevils which attack the tubers of the sweet potato at Hawaii. The smaller one is the insect mentioned in the fauna under the name of *Hyperamropha squamosa* Blackburn. It is now thought that it is the common West Indian form *Cryptorhynchus Batatae* Waterhouse. This is the commoner of the two in Hawaii, but is not generally prevalent. The larger of the weevils is *Cylas formicarius;* it is a native probably of Cochinchina, but is now very extensively found in the Tropics. It is not very common at Hawaii. It attacks *Ipomaea pes-caprae* as well as *Batatas edulis*.

Less important foes. There are some minor pests of the sweet potato. *Nesosydne ipomoeicola* and *Aloha ipomoeae* are two common leaf-hoppers on this plant. *Plusia chalcites* sometimes attacks the foliage. A mealy bug (undetermined species of *Pseudoccus*), and a scale-insect (*Saisettia* sp.) are commonly met with, and the Japanese beetle (*Adoretus tenuimaculatus*) sometimes attacks it and skeletonizes the leaves.

The leaf hoppers are much parasitized by *Anagrus, Stylops* and *Echthrodelphax,* and are not of much importance.

Plusia is not very dangerous, and has tachnid flies for parasites. The Coccidae are unimportant, and the Japanese beetle seldom does any harm.

Useful insects. The wasps of the genus *Odynerus* prey on caterpillars of medium sized Lepidoptera and carry them off to their nests to feed their young. The most common species is probably *O. nigripennis*. The Polistes wasps act in the same way. Certain predacious bugs (*Oechalia grisea, Zelus renardii* and *Reduviolus Blackburni*) are active on the sweet potato.

Methods of control. On account of the numerous caterpillars which eat the leaves of *Batatas edulis,* the latter should be sprayed 4 to 5 times a year with an arsenical preparation. Arsenate of lead is recommended as the most useful and the least likely to burn the leaves.

In the case of a serious infestation, sweet potato growing should be given up for a certain time.

Another sweet potato pest is described in the *Rhodesia Agricultural Journal* (vol. 8, No. 3, pp. 438-440, Salisbury; February 1911), It is said that the Tortoise Beetle (Cassidinae) has been much more plentiful this season (1910-1911) than all the other insects which attack the potato in Rhodesia, and has caused great damage in several places.

In addition to *Batatas edulis* the insect has also attacked the creeping *Ipomaea,* and has been found in large numbers on the leaves of the melon. This pest could be easily controlled by sprayings of arsenate of lead. One lb arsenate of lead in 20 gallons of water is sufficient to kill these insects.

W. W. Froggart. **The French - Bean Fy.** (*Agromyza Phaseoli* **Coquillet).** — *Agricultural Gazetze of New South Wales*, vol. XXII, Part 2, pp. 151-154. Sydney, February 1911. **1820**

New South Waels

No market gardener of New South Wales had ever remarked this disease of the French bean until it appeared in the district of Gosford in the spring of 1898. Last year, 1910, it not only reappeared as a serious pest but spread over a much larger area than in the preceding years. The insect is apparently an indigenous species, and it is very remarkable to see how local it is in its range; starting about Kincumber, it reaches only to the district of Gosford around Erina and Wamberal. It is known to gardeners in the larva and chrysalis states.

The adult is a small short, broad black fly, which measures only 1-5 mm. in length. It attacks the main stem of the bean from the surface of the soil to a height of about two or three inches. The eggs are deposited in cracks, or beneath the epidermis of the plant. When numerous, the flies also attack and injure the petioles; they puncture the upper surface of the leaf at the junction with the petiole, and sometimes the larvae burrow tunnels down the latter.

Remedies. Growers find that the flies may be controlled in good growing weather by banking up the plants before the insects make their appearance. No spraying or wash seems to have any effect on the flies, and as the larvae do not feed on the surface of the plant, but in the tissues, no poisonous spray upon the foliage would injure them. It is a case for clean cultivation. All infested plants should be removed and burnt, as soon as the beans are gathered.

E. Miège. **Vegetable and Animal Parasites of Buckwheat (*Fagopyrum*).** — See No. 1290 of this Bulletin. **1821**

G. Martelli. ***Pieris Brassicae* L., and *P. Rapae* L., Parasites of *Capparis rupestris* Sm.** — (La *Pieris Brassicae* and *P. Rapae* L., parasite del *Capparis rupestris* Sm. *Mem. Classe Scienze, R. Accad. Zelanti*, vol. VIII, pp. 4, Acireale, 1910). *Rivista di Patologia vegetale*, anno IV, n. 19-22, p. 309, Pavia, March 15, 1911 **1822**

Italy: Sicily

The larvae of *Pieris Brassicae* and *P. Rapae*, according to observations made at Acireale, Sicily, appear to attack the caper-bush and devour its leaves as well as those of the cabbage.

The butterflies of these two kinds of *Pieris* deposit their eggs on the cultivated cabbage, and also on the caper-bush, on which they fulfil their complete biological cycle. For this reason, *P. Brassicae* and *P. Rapae* should be considered as habitual, and not merely occasional, parasites of *Capparis rupestris*.

1324 L, LAUBERT and M. SCHWARTZ. **Diseases and Enemies of the Rose.** See No. 1294 of this Bulletin.

1323 **Causes of the decreased Vintage in France in 1910.** See No. 1283 of this Bulletin.

1325 P. R. JONES and J. R. HORTON. **The Orange Thrips. A Report of Progress for the Years 1909-1910.** — *U. S. Dept. of Agr. Bureau of Entomology, Bulletin* N. 99, Part I, 8°, pp. 16 + Plates III, Washington, March 6, 1911.

United States: California and Arizona

The orange thrips (*Euthrips citri* Moulton) is a small orange yellow insect of the order Thysanoptera which curls and distorts the leaves and scars the fruit in the valley of San Joaqin in California — the orange belt of South California — and the Salt River valley in Arizona.

The havoc caused by this insect, which was first noticed 15 or 16 years ago, has considerably increased with the development of the citrus fruits industry, and has recently assumed serious economic importance.

The orange thrips is probably native to North America. Its natural habitat is probably the Sierra Nevada foot-hills or the adjoining plains of the southern San Joaqin valley. It was thonght that the thrips attacked only citrus trees but entomologists have discovered it on other host plants.

The following citrus fruits are attacked; *Citrus Aurantium* var. *sinensis*; *Citrus nobilis*; *Citrus decumana*; *Citrus medica* var. *Limon*; *Citrus medica* var. *acida*; and *Citrus japonica*.

The following miscellanons plants fall victims: *Punica Granatum, Vitis vinifera, Schinus molle, Pyrus communis, Prunus Armeniaca, Prunus Persica, Prunus domestica, Salix* sp., *Rumex* sp., *Portulaca oleracea, Olea europea, Rubus idaeus, Rosa* sp., and *Solanum* sp.

Injury to citrus trees and fruit is caused directly by the feeding of both adults and larvae upon the surface of the parts attacked. They consume the young fruit, the nearly mature fruit, and the new tender foliage.

The orange thrips has numerous generations every year; its life cycle is about 20 days, and it is found on the trees from March to November.

The thrips may be destroyed with four sprayings of a solution of lime-sulphur solution combined with an extract of commercial tobacco, which should be applied when the insects are fairly numerous. Three applications must be made in spring to protect the fruit and spring buds, and the fourth in the autumn to lessen the injury to the autumn growth of the trees. From 2 to 8 gallons of this combination spray should be used per tree, and the spraying should be done very thoroughly and at high pressure, because only those thrips which are hit by the solution are killed.

Some spraying experiments have shown that three thorough applications at the proper times have resulted in from 20 to 60 % more "fancy" fruit in the sprayed than in the unsprayed blocks.

The following are other thrips which attack the orange tree: *Euthrips occidentalis* Pergande, which is only found at times and rarely does serious damage, and *Euthrips Tritici* Fitch, which sometimes infests the orange trees in the north central portion of California.

S. A. ROHWER. **The Genotypes of the Sawflies and Woodwasps of the Superfamily Tenthredinoidea.** — *U. S, Dept. of Agr., Bureau of Entomology. Technical Papers on Miscellaneous Forest Insects, Technical Series*, No. 20, Part II, p, 69-109, Washington, March 4, 1911. **1326**

North America

The Sawfly and Woodwasp belong to the superfamily of Tenthredinoidea of the order of Hymenoptera, and are amongst the most important enemies of forest trees in North America. The real sawfly, in the larval stage destroys the leaves of conifers and other trees; the larchsawfly, which lives on the foliage of this tree in Europe and North America is extremely destructive. The woodwasp in the larva state burrows holes in dying and dead standing and fallen trees, causing a rapid deterioration of the timber. In addition to a large number of species which belong to the United States, there are several other very destructive species which have come from other countries. The knowledge of these insects, from the scientific and economic points of view, is very limited, especially as far as the North American species are concerned.

Mr. Rohwer has been nominated by the Bureau of Entomology of the United States Department of Agriculture to study the Sawfly.

The present paper contains part of the results of his preliminary work andgives an alphabetical list of the generic names used in the super-families of the Tenthredinoidea and Siricoidea with their type species and the synonyms of certain genera.

It also gives the summary of the work of William H. Ashmead on the Tenthredinoidea.

Mr. Rohwers' future papers will be in the form oi monographs dealing with special groups.

1827 L. M. ELLIS. **Some notes on Jack Pine, *Pinus divaricata*, in Western Ontario.** *Forestry Quarterly*, vol. IX, N.1, pp. 1-14. — Cambridge, Mass., March, 1911.

Canada The sound trees of the *Pinus Banksiana* or *P. divaricata*, are practically exempt from insects. In the rare cases where sapling trees have been wounded, a resinous excrescence has been noted, on which a chrysalis, presumably *Retina Comstockiana* was developing.

The trees which are damaged by fire, on the contrary, are attacked by insects of the genus *Monohammus* and *Pissodes Strobi*, to such an extent, that in two seasons the wood became useless for lumber, and could only be used for making sleepers.

1828 **The Destruction of Field Mice.** (La destruction des Mulots et Campagnols). — *Le Cultivateur Français*, 5^e^ année, N^o^. 7, p. 7, Lyon, Feb. 18, 1911.

France In order to destroy field mice (1) the Agricultural Station at Blois recommends the use of baryta bread (wheat flour with the addition of carbonate of baryta and coloured with colcothar), which the rodents eat readily. One to three pieces should be placed in each of the holes which are frequented, and the opening then filled up with a stone. Holes in slopes should be treated with especial care, as well as those in hedges and along the edges of roads, where the rodents prefer to congregate. The best time for the treatment is when the animals have most difficulty in finding food, viz from November 1st to March 20th, whenever the earth is not covered with snow. A kilogram of bread is sufficient for a hectare. Care must be taken to keep the bread out of the way of useful animals, because the poison is very strong and dangerous even to man.

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(1) See Nos. 361. 362, 363 of this *Bulletin* for Jan. 1911.

1829

J. SURCOUF. **Stinging and Bloodsucking Insects which trasmit Diseases.** (Les insectes piqueurs et suceurs de sang transmetteurs des maladies). — *L'Agriculture pratique des pays chauds,* 11e année, N.o 96, pp. 244-248. 1 fig., Paris, March, 1911.

Indo-China: Annam

The results of investigations on puncturing Diptera in the environs of Hué (Annam).

This study is of eminently practical interest, because Annam is a region where the «Surra» (1) makes great ravages as an endemic disease. From 1904 to 1909, Mr. Bauche verified the death of fifty horses, buffaloes and dogs from this cause in Hué alone.

The stinging flies: Taons, *Chrysops*, *Stomoxys*, appear at the end of the rains, during the fine weather of March.

A large number of specimens have been sent to the Colonial Laboratory of the Natural History Museum at Paris, but the number of the species is very small, and there is only one species of Taon (represented by 283 specimens, 277 of which are females and 6 males), and described by the writer as new under the name of *Tabanus annamiticus* - and one species of *Chrysops*, *C. dispar* Fabricius (= *C. impar* Rondani, *C. ligatus* Walker, *C. lunatus* Gray, *C. terminalis* Walker). This species, represented by 34 specimens, was already known in Southern Asia, the Philippine Islands, Hong-Kong and the Indian Archipelago, but had never before been observed in Annam.

These investigations, if carried out systematically, might result in a typical collection at the Colonial Laboratory of the Museum of stinging and blood-sucking insects found in the Colonies. These collections would be of the greatest use in colonisation, because the insects which transmit microbes could be studied and destroyed with certainty.

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(1) Epidemic disease of domestic animals due to the first pathogenic trypanosome known, *Trypanosoma Evansi* Steel, discovered by Evansen in 1880 in India. Cf. M. NEVEU-LEMAIRE. *Précis de Parasitologie humaine,* 4e edit. p. 256, Paris, 1908. (*Ed.*)

1880 R. A. Black. **Hemlock (*Conium maculatum*) Proclaimed a Weed.** — *The Agricultural Gazette of Tasmania*, vol. XIX, N. 2, pp. 72-73, Tasmania, Feb. 1911.

Tasmania Under Section 6 of the Local Government Act, 1906 (6 Ed. VII, N. 31), of December 20th, 1910, the hemlock was proclaimed an injurious weed in the territory of Table Cape; since then the decree has been extended to the whole of Tasmania.

It is incumbent now upon all Municipal Councils to take measures for the destruction of the weed. Section 3 of the Californian Thistle Act, 1883 (47 Vict., N. 17), as read with subsection 12 of section 130 of the local Government Act., 1906, provides that all holders of lands in Tasmania in which the hemlock is found to be growing must cut it down in order to prevent it from blossoming or be liable to a penalty not exceeding £ 20.

I. A. R. I. 75.

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